Telephone Engineer

Published Monthly by TELEPHONE ENGINEER PUBLISHING COMPANY
Office of Publication: Morton, Ill. Editorial Office: 185 North Wabash Ave., Chicago, Ill.

J. A. SMITH, President and Treasurer, 185 N. Wabash Ave., Chicago
C. L. JONES, Vice-President, Athens, Ohio
D. WEINER, Secretary, 185 N. Wabash Ave., Chicago
RALPH C. RENO, Vice-President, Chicago
HAROLD L. BEYER, Vice-President, Chicago, Ill.
F. A. BOWDLE, Vice-President, Wheaton, Ill.
RALPH C. RENO, Editor, 185 N. Wabash Ave., Chicago
Eastern Representative, H. S. DURLAND, 63 Hinsdale Pl., Newark, N. J.

SUBSCRIPTIONS:—The subscription price of TELEPHONE ENGINEER is $2.00 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries $4. Single copies, U. S. A., 20 cents.

ASSOCIATED PUBLICATIONS: ENVELOPE & SPECIALTY PAPER INDUSTRY, SOUTHERN FLORIST & NURSERYMAN, DRYCLEANING PROGRESS, AUTOMATIC WORLD

Entered as second-class matter, at the post office at Morton, Ill., under the act of March 3, 1879.

Volume 36 DECEMBER, 1932 No. 12

CONTENTS FOR THIS ISSUE

EDITORIALS 11-12
YULETIDE GLADNESS—THE ISSUE MUST BE MET.

VACUUM TUBE THEORY AND PRACTICE.13-14-15

MISSOURI CONVENTION WELL ATTENDED 15

EFFECT OF DEPTH OF EMBEDMENT ON POLE STABILITY—*By J. F. Seiler*.....16-17-18-20

TRIBUTARY EXCHANGES AND TRUNKLINES —*By F. J. Dommerque*.....19-20

THE TECHNICAL CLEARING HOUSE—*By B. C. Burden* 21

RENOGRAPHS 22

TELEPHONE ACTIVITIES IN FOREIGN COUNTRIES 23

THE LATEST TELEPHONE APPARATUS PATENTS—*By Ben J. Chromy*.....24-26

ELKHART, KANSAS CUTS OVER TO KELLOGG —*By W. C. Strehl*.....25-26

THESE "WET JOINTS" ARE NOT JOY MAKERS, DILLON EFFECTS CURE..... 28

NEW EQUIPMENT AT TAFT, TEXAS—*By P. Winemiller* 30

ILLINOIS HOLDS ANNUAL CONVENTION.... 32

NEWS FROM THE FIELD..... 34

WITH MANUFACTURERS AND JOBBERS..... 36

EDITORIALS

Yuletide Gladness

A minister recently startled his congregation by saying that "if his wife were to die tonight he would thank God." He did not mean to say that he would thank God for taking her away, but for sparing her to him for many years of happiness. He turned a startling statement into a beautiful tribute.

The past three years have been trying ones for most of us—I might say all of us. Should our business be taken from us now, we can feel grateful that we have been permitted to carry on much longer than other and possibly greater men and greater businesses have. We can feel grateful because we have been able to assist others more unfortunate than we.

Most of us have "'weathered the storm" and feel we are in position to serve for many years to come. Isn't this a wonderful thought after all? Shouldn't we feel grateful?

The New Year offers many hopes and anticipations for us who have strength, home, family, and sufficient to feed and clothe us during the winter. For those who have more, an abundant future unfolds before them.

At this birthday of our Saviour let each of us give birth to new hopes and ambitions, new ideals and ideas. In these are life itself. To help make someone else happy is the very foundation of happiness.

May each of our readers realize a full share of happiness at this Christmastide and may the New Year more abundantly fulfill every desire of their heart.

* * *

Issue Must Be Met

The increasing demand of the uninformed public, together with the declaration of a large number of newly elected officials that upon taking office they intend starting investigations of utility rates with reductions in mind, should stir every telephone man to action with the thought that he should be prepared to meet every argument with facts and figures.

If there ever was a time when accountants should be consulted with the idea of bringing the company books down to date, showing where every item of expense can be traced and verified, it is right now. Demands for reductions are going to become heavier during the next few months because candidates were elected upon their promises to reduce taxes, and these officers feel they will have to make good.

There is one consoling thought to be had from the threat, and that is that courts will not place burdens upon utilities heavier than they can bear. But it is going to be the duty of the utility to present evidence to this effect, and it is going to have to be done by showing a financial statement that cannot be refuted by the opposition. Such statements will have to be prepared by accountants who have been experienced in this line of work, and who know how to catalog every item where it will not be thrown out by the courts.

We believe that many companies can build up good will in the communities they serve by inviting the public to inspect their books. It might be advantageous in some cases even, to publish a condensed financial statement much the same as a bank does. Such action must prove to the community that the company is acting in good faith and would do much to prevent or cure that feeling of animosity toward any utility which sometimes exists when the public feels that it is being exploited. The services of an experienced auditor will add weight to such a statement in the eyes of the public.

It will be claimed that a rate reduction will bring increased business and add additional stations, but the experience of telephone men has shown that this is not the case. When a subscriber gets "economy conscious" he will not consider cheaper grade of service; nothing short of a phone removal will satisfy him. Many instances can be sighted where subscribers complained of rates, but would not consider a party line, altho the price was greatly reduced. Usually they tell you rates are too high, therefore he will consider nothing but cancellation outright. New prospects are hard to convince also.

It is well to remind these well meaning citizens and officials that our rates are not fixed by ourselves alone but must be approved by commissions in many states, and these commissions are supposed to be acting for the public good. In the boom years preceding the crash in 1929 the utility rates did not increase with all other prices. In many cases there was no increase at all and hence no great period of prosperity for the telephone industry as compared with other lines of business not under any governmental restriction. The utilities were regarded as public servants and monopolies in their fields and hence not entitled to as great a profit as unregulated industries. Since the utilities are so vital a part of our modern world, are they not entitled now to some protection from that mob psychology for economy which is sweeping the country?

It is our opinion that any reduction short of 25% to 35% would be unsatisfactory to the man who has a grudge, and of course this is out of the question. Therefore every effort should be made to retain the subscriber by educating him through personal contact, advertising definite facts and figures and by keeping proper accounting systems so that every statement made can be borne out by an audit of the books.

Auditors can be secured now at a very low figure and it is going to be good business for the telephone man to have everything ready when the demand comes for reduced rates.

AUTHORIZES PURCHASE OF 4 PHONE EXCHANGES

An order issued recently by the State Public Service Commission of Missouri, authorizes the purchase by P. K. Higgins of University City of four telephone exchanges operated by the Citizens Public Service Company at New Haven, Owensville, Bland and Sullivan. The purchase price of the four exchanges is $49,324, the purchaser assuming an indebtedness of the company to the Southwestern Bell Telephone Company of $26,324, and other indebtedness for unpaid wages and other items totalling $20,892.

The Citizens Public Service Company operates thirty-seven telephone exchanges scattered over the counties of Osage, Maries, Crawford, Gasconade, Washington and Franklin. The four sold are somewhat isolated from the other properties.

Authorities of New Haven, Owensville, Bland and Sullivan offered no objection to the sale being consummated.

VACUUM TUBE THEORY AND PRACTICE

SUBJECT: PUBLIC ADDRESS SOUND TRUCKS

General

Any company engaged in Public Address work should have a "sound truck." For the benefit of those not familiar with the term, we may define a "sound truck" as an arrangement of public address amplifiers, loud speakers, and associated input equipment mounted in a light truck or passenger car and so designed that the system may be operated either when the car is in motion or when stationary.

Fig. 1. Fox dynamic diaphragm loud speaker unit.

The statement that every company engaged in Public Address work should have a "sound truck" is based on the reports of companies who now have them. They state that a sound truck not only greatly reduces the labor of making outdoor installations but is an excellent type of advertising as it tends to remind the public where "sound" service can be obtained.

A properly designed sound truck can roll up to an outdoor job and have the complete sound system ready for operation in a matter of minutes, whereas, by the old method of carting all the separate units out to the job, hunting up a suitable location to set up the equipment, and then running wires here and there often required from 4 to 10 hours.

One company that has been particularly successful in the public address field has been overriding competition by offering as an extra inducement on country and state fairs and similar jobs the use of their sound truck a specified number of times per day for ballyhoo purposes on downtown streets.

Another company reported that substantial revenue was being derived from their sound truck from jobs sold to auctioneers. At big auction sales the sound truck can be used not only to make it easier for all of the crowd to hear the auctioneer, but as a means of furnishing musical entertainment both to draw and hold the crowd.

Sound truck service can also be sold to the merchants in the smaller towns for rooting purposes at baseball and football games, short advertising announcements being made at various times during the game.

Booster trips put on by the merchants of the smaller towns usually require a sound truck for ballyhoo purposes.

Inasmuch as most legitimate concerns engaged in public address work usually have a light truck which is devoted almost exclusively to this work, the cost of fixing up a full fledged sound truck should not be excessive.

This article discusses the general design features of sound trucks which should adequately serve the average company engaged in public address work.

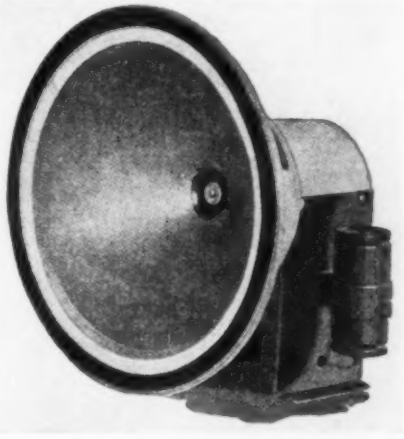


Fig. 2. Wright De Coster No. 207 special C. A. dynamic cone loud speaker unit.

General Design Features of a Sound Truck

A general purpose sound truck need not be large to be effective and for most purposes light cars such as the Ford and Chevrolet will serve very nicely. Panel type bodies with a rear door present a nice appearance for a sound truck, and effective advertising can be lettered on the panels.

In designing a sound truck the first step is to consider what equipment will be required to produce and project the desired audio power. For most purposes an audio amplifier with an undistorted audio output of from 10 to 15 watts should prove adequate, both for sound distribution directly from the truck or for use at the various types of outdoor installations. Where dynamic diaphragm type projectors or following power supply arrangements special high efficiency dynamic cones are used, 15 watts of audio power will serve 90% of the public address jobs ordinarily encountered.

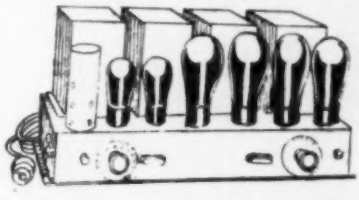


Fig. 3. Coast to coast special sound truck amplifier.

For the occasional outdoor job requiring higher audio output additional amplifiers can be used and fed from the same input source, or where exceptionally high power is required a 50 watt amplifier should be used.

Loud Speakers

The next consideration is the loud speaker. Because of the desire where possible to use power not to exceed 15 watts of audio power, the dynamic moving coil diaphragm type speaker such as the Fox unit illustrated in Figure 1 is preferred because of the higher efficiency of this type unit as compared to the ordinary dynamic cone speakers. If high efficiency dynamic cone type speakers (special public address design)—such as the Wright De Coster No. 207, shown in Figure 2 are used results comparable with those of the dynamic moving coil diaphragm type units will be obtained.

The number of horns required will of course depend on the use to which the sound truck is to be put. A popular arrangement is the use of four 6½ ft. exponential trumpets equipped with one moving coil driver unit such as the Fox, or six or eight Wright De Coster No. 207 dynamic cone units equipped with projection baffles.

Power Supply

The power supply usually gives the designer of a sound truck the most trouble. In order to be able to operate the sound equipment while the

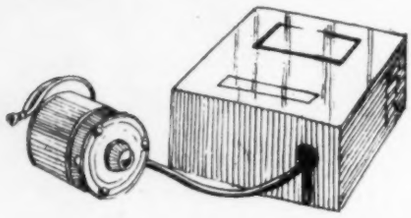


Fig. 4. Coast to coast converter.

sound truck is in motion one of the following power supply arrangements must be used.

(1) Use "B" batteries for plate potential, and the car or auxiliary batteries for filament supply to the vacuum tubes and field current supply to the dynamic loud speaker units.

(2) Use a dynamotor or other form of converter which converts the 6-volt supply from the car battery to 110 volts, 60 cycle current.

(3) Use a 6 volt D. C. 110 volt, 60 cycle A. C. generator which replaces the regular car generator and which requires that the car engine be running when the P. A. system is used.

(4) Use a small gas engine driven A. C. generator mounted as a separate unit in the truck.

Of the above power supply arrangements, all are more or less expensive with the usual design of amplifier due to the amount of power that is required by the amplifier.

Special Sound Truck Amplifier

An exceptionally efficient 12 watt sound truck amplifier recently placed on the market by the Coast to Coast

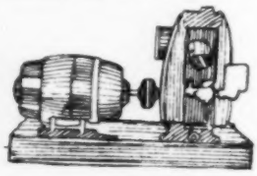


Fig. 5. Esco sound truck engine driven generator.

Radio Corp., 125 West 17th St., of New York, N. Y., makes possible for the first time high audio power output with the use of a low power DC to AC converter as the total AC power consumed by this amplifier **is only 60 watts.**

This amplifier requires 110 volt, 60 cycle current which can be obtained from a special coast to coast converter which changes the 6 volt storage battery current to 110 volts at 60 cycles at 60 watts output.

This converter is very reliable in operation and utilizes a small motor driven interrupter rather than the usual vibrating type contacts. Its power output is sufficient to supply the special sound truck amplifier for which it is designed.

The special amplifier requires 2-236, 4-42, and 1-82 type tubes. The 236 is an automobile type screen grid tube, the 42 is an automobile type pentode (output approximately 3 watts), and the 82 is the new mercury vapor rectifier tube. The four pentodes are used in a parallel class A push-pull circuit.

The amplifier is so arranged that it may be used either with the special converter or connected directly to the 110 volt, 60 cycle lighting circuit. The gain is sufficient to give full output when used with any sensitive two button carbon microphone. This amplifier with associated converter sells for around $75.00 and this combination is recommended to anyone desirous of building up an economical and efficient sound truck. Figure 3 illustrates this amplifier and Figure 4 the special converter.

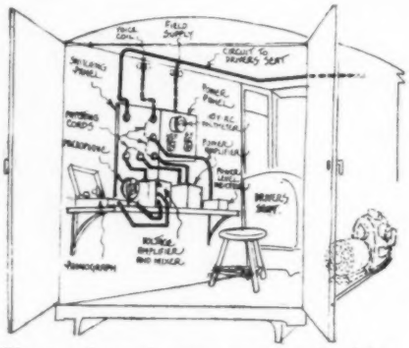


Fig. 6. General arrangement and wiring plan of sound truck.

When higher audio power than 12 watts is desired a gasoline driven 110 volt 60 cycle generator unit is recommended.

Efficient units which will deliver up to 500 watts can be obtained for about $145.00. Such a power unit will supply sound systems with as high as 50 watts audio power rating. The Electric Specialty Company of Stanford Conn., manufacture a unit known as the Esco 500 watt gasoline driven unit, which is especially satisfactory in connection with the larger sound truck installations. Figure 5 illustrates one of these Esco units.

Sound Truck Wiring Arrangement

While the actual equipment arrangement and wiring plan that should be followed in designing and building a sound truck will vary widely depending on the type of truck, equipment to be used, etc., nevertheless the general arrangement for different trucks will be somewhat the same.

Figure 6 illustrates schematically a good arrangement and wiring plan that can be followed in building up a sound truck.

It will be noted that four 6½ ft. exponential trumpet type horns equipped with Fox dynamic units comprise the projector equipment (dynamic cone units of the Wright De Coster No. 207 type will serve equally well). The horns are held in place on the roof of the truck by means of hold-down clamps. A rubber pad between the roof of the truck and the base of the horn

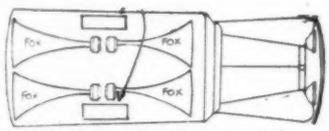


Fig. 6-A. Top view of horn arrangement.

should be used to absorb vibration and to prevent damage to the roof of the car. In connection with large outdoor jobs where the audience is grouped in the grandstand, etc., the four horns are all shifted to one side of the truck as shown in Figure 7 and fanned out so as to properly distribute the sound.

By using several dynamic units on each horn the necessity for a larger number of horns is avoided. No. 18 rubber covered paired wire is used to connect the voice coils of the horns to the amplifiers and No. 14 rubber covered paired wire to connect the fields to the field supply source.

Two power receptacles located at one side of the car serve as a convenient point to connect the projector circuits to the amplifier equipment in the truck.

It will be noted that the phonograph pickup, microphone, mixer panel and amplifiers are all located on a narrow shelf built into one side of the truck. A switching panel located directly above this shelf provides a convenient

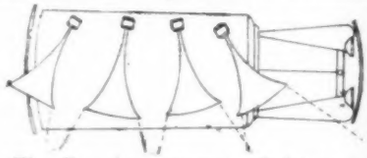


Fig. 7. Arrangement of horns to distribute sound directly from truck to grand stands, etc.

terminating point for the various circuits and equipment. Thick sponge rubber pads serve as a cushion under the various units and a narrow wood strip around the shelf prevents the equipment from sliding off the shelf.

The power source is located directly back of the drivers seat on the opposite side from the amplifying equipment. If a gasoline engine driven unit is used, it should be mounted on several thicknesses of 1" hair felt to absorb vibration from the engine.

Convenient outlets extending from the switching panel to the drivers seat,

and to the rear end of the truck, permit the mixer panel, microphone, and phonograph to be moved to the drivers seat or to any point outside the truck without stringing wires over the equipment. Padded drawers built under the shelf are used for storing microphones, tubes, etc.

A wire reel located on the wall opposite the shelf makes a convenient accessory in taking down and putting up long runs of wire. A number of hooks are provided for storing shorter lengths of wire, extension cords, and microphone leads.

Operation of Sound Trucks

When sound trucks are used for ballyhoo purposes while the truck is in motion the best arrangement is to employ two men, one who drives the truck and the other who operates the sound equipment and makes announcements.

Where a second man is not available the mixer control panels, microphone, and phonograph should be moved into the front seat where it can be operated by the driver. Convenient receptacles located either on the roof of the driver's cab or at the side of the cab make it easy to connect the pick-up equipment to the amplifiers when operated from the driver's seat.

When on location in connection with an outside job the four horns are fanned out on the roof of the truck as previously explained. The mixer panel and input equipment is moved to any convenient location from which all of the microphones in use can be viewed.

On many outdoor jobs it will be possible to locate the mixer panel on a small card table set near the truck so that the operator can properly control the microphones, and yet be close to his truck, this eliminating the necessity for two men.

Where it is impossible to locate the truck in a position which will permit projecting the sound directly from the roof of the truck, it will be necessary to mount the horns either on 16′ or 20′ 4″ poles set at the proper location, or on available buildings, trees, etc.

A 2″ galvanized iron pipe which can be inserted in rings on the side of the truck and which projects from 4 to 8 ft. above the roof should be used to elevate the voice and field wires where they extend from the truck to horns which are located some distance away.

If the horns are located at a considerable distance from the driving amplifier it is desirable to use a tube to line transformer at the amplifier end, and a line to voice coil transformer at the loud speaker end, in order to avoid excessive energy loss such as would result if the matching transformer between tubes and voice coils was located at the amplifier end and low voltage high current audio power was transmitted over a comparatively long line.

Missouri Convention Well Attended

Two Hundred Registered at Recent State Meeting of Telephone Men and Women. Program Received Close Attention. Old Officers Are Re-Elected.

Missouri held its annual convention at Kansas City November 10th and 11th with a fair attendance and much interest. As has been the custom for many years the convention re-elected Houck McHenry as president and R. W. Hedrick as secretary; both of these gentlemen reside in Jefferson City.

The address of President McHenry is an interesting document in that it covers many subjects of interest to the industry in a very able manner. Rate reductions comprise a greater part of the address, and naturally these subjects are uppermost in the minds of the telephone interests and the public at this time. On the matter of rate reductions Mr. McHenry says in part:

"I believe that the people in Missouri and all parts of this country are alike and are susceptible to plain reasoning. I venture to say that in this city a very small percentage of the people has any specific idea as to what is required of a telephone company in way of investments, rates and earnings; and I venture to suggest that where agitation is started for the reduction of rates, a plain, honest and straight-forward exposition of the laws and conditions under which we are operating made to those who are most active in the agitation for reduced rates will obviate a great deal of our trouble.

"We in Missouri have not been free from applications for reduced rates. Particularly has this been true in regard to rural telephone rates where the prices of the farmers' products have been so seriously diminished. During the past two years there have been many applications and petitions filed with the public service commission of our state asking for reduced rates. These are based upon the argument that commodity prices have been materially reduced and that telephone prices should follow; and I know you will pardon my local pride when I state to you that it is to the everlasting credit of the telephone industry in Missouri that none of these applications and petitions for reduced rates has been because of poor service.

"If telephone companies were to answer their subscribers in simple language, stripped of all the legal and technical verbiage usually heard at a rate hearing, they would say something like this:

"'Prices which have been falling are the same prices which went up during and after the war. They are the kind of prices — unregulated by state commissions—that depend on supply and demand and what the buyers are willing to pay. The price of telephone service is not arrived at in such manner. The rental of a telephone depends on how much money is needed by the company to give adequate service, pay fair wages and earn a reasonable return for the investors.

"For that reason, telephone service, subject to regulation by local commissions, did not go up in price along with food, clothing and other necessities. For that reason, it can hardly be expected to come down."

In a lengthy review of the present day situation Mr. McHenry points out many reasons why rates are reasonable and cannot be reduced. He discussed the Wisconsin rate hearing very thoroughly.

President F. B. MacKinnon of the United States Independent Association addressed the convention, his address being somewhat similar to others of recent months. He paid a tribute to Edward Kimball Hall, former vice president of the American Telephone & Telegraph company, who died at his home in New Hampshire, November 10th.

Other addresses and sessions held the interest of the convention for two days. A banquet and dance at the Hotel President was enjoyed by the members and visitors at the convention. Plant and Traffic conferences were held for those interested in such work.

The following officers were elected at the close of the second day; Houck McHenry, president, Jefferson City; A. M. Benedict, first vice-president, Richards; W. R. Journey, second vice-president, Higginsville;; T. R. Schweer, third vice-president, Clinton; Elmer Weakley, fourth vice-president, Platsburgh; R. W. Hedrick, secretary, Jefferson City.

Effect of Depth of Embedment on Pole Stability

(SECOND INSTALLMENT)

An Investigation of the Stability of American Standards Association Class Poles Subjected to Horizontal Breaking Loads—Effect of Depth of Set, Pole Diameter and Character of Soil on Stability—Preliminary Method for Determination of Depth of Embedment to Develop Strength of Pole in Various Soils

By J. F. SEILER
Engineer, Service Bureau, American Wood-Preservers' Association

This is the second and last installment of Mr. Seiler's article. The first part appeared in the November issue.

Fig. 3 shows the results of tests conducted by the North Carolina State College of Agriculture and Engineering, where poles of various sizes and set at various depths, in hard clay soil, were overturned in a stability test. The plotted points represent the values of P for the several settings, and the curve

$$P = 1250d^2$$

represents fairly accurately the relation between P and d for that particular soil.

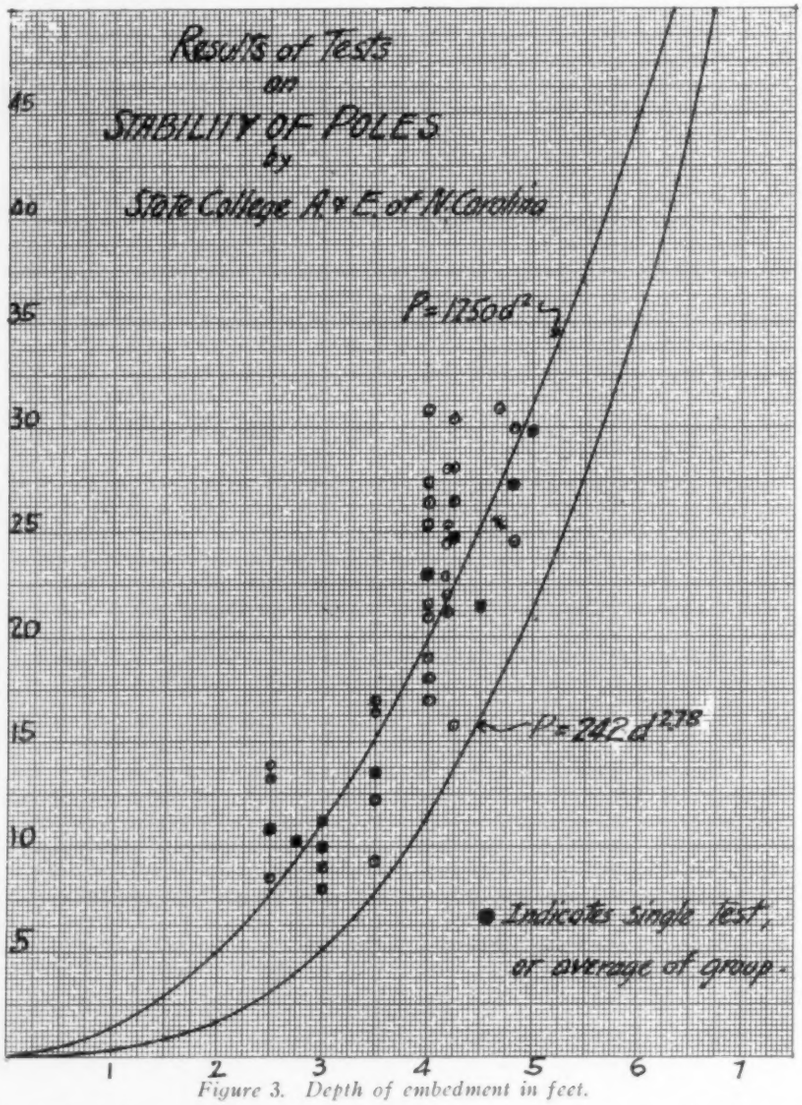


Figure 3. Depth of embedment in feet.

The force P is, obviously, the prime factor involved in the overturning of the poles, and therefore its value is computed for the load W which in each case resulted in overturning the pole.

Tests on guard rail posts, conducted by the State Highway Board of Georgia, gave an average value of $P = 4{,}800$ lbs. for a depth of setting of 4 ft., in what might be classed as "Poor" soil. Assuming that the parabolic law would apply in this case, the equation

$$P = 300d^2$$

results. In both the Raleigh (North Carolina State College) and Atlanta (Georgia State Highway Board) tests, there was no indication that diameter of poles or posts had any effect on stability, and in the Atlanta tests there was a very substantial variation in diameter or transverse dimensions of posts tested. The horizontal load W required to overturn the posts varied from 3,600 to about 4,000 lbs., but no relation between the smaller loads and smaller sizes of posts was apparent.

If the soil in the Raleigh tests may be taken as "Good to Best" and that of the Atlanta tests taken as "Poor," then there is an interesting comparison between the resistance of soils to shear and their bearing capacities, as assumed for the design of foundations. For example, the bearing capacity of best soils (of the compressible or granular type) is usually taken at from 4 to 7 tons per square foot, an average of 5½ tons. That of average soils runs from 2 to 4 tons, or average of 3 tons, while poor soils run from ½ to 2 tons, an average of 1¼ tons. Thus the best soils may develop bearing capacities, in general, of about four times that of poor soils, while average soils may develop twice or more the capacity of poor soils. Since the soil in the Raleigh tests is actually in the class of "Good to Best" soils, and since the coefficient of the formula for the Atlanta tests is about one-fourth that of the Raleigh tests, it would seem that the analogy might be carried out, and the formula deduced from the Atlanta tests be made applicable for "Poor" soils, within the scope of this study. As a matter of fact, it would be expected that guard rail posts set in compacted fills of clay running about 50 to 60 per cent sand, or equivalent, as in the Atlanta tests, would very nearly fulfill this conception. With this in mind it is proposed to adopt for our purpose here the following equations:

$P = 1250\ d^2$ for "Good to Best" soils
$P = 625\ d^2$ for "Average" soils
$P = 300\ d^2$ for "Poor" soils

Where P is the reactive force applied near the butt, which will cause the pole to overturn.

If the pole is set at a depth such that the force P represents that due to the breaking load W, then the full strength of the pole can be developed. In calculating the depth of set in accordance with the above formulae, it is found that the unit pressures developed are considerably higher for short poles than for long ones, whereas it would seem preferable to have this condition reversed. While poles in the Raleigh tests developed upwards of 20 tons pressure (maximum) per square foot before failure, angular displacements were excessive. On the other hand, in the same soil, pressures of about 18 tons for longer poles, set at greater depths, and due to breaking loads, would probably not be excessive. It is therefore considered proper to adjust the formulae above to give results such that the pressures developed by short poles would be equal to or less than those developed by the longer poles. In other words, stability against angular displacement is the governing factor for short poles, while stability against overturning should govern for long poles.

American Standards Association Breaking Loads for Poles

Class 1	4,500 lbs.
Class 2	3,700 lbs.
Class 3	3,000 lbs.
Class 4	2,400 lbs.
Class 5	1,900 lbs.
Class 6	1,500 lbs.

The curve $P = 1250d^2$ (applicable to best soils) gives for a 90-ft. Class 1 pole a depth of set of 8 ft. 3 in., and the maximum pressure developed at the butt for an average size pole will be about 18.5 tons per square foot. Assuming that satisfactory results could be obtained if not greater than such pressure would be induced by a pole whose breaking strength is developed with a depth of set of 5 ft., then a curve giving a value of $P = 21{,}200$ lbs. for $d = 5$ ft., and $P = 85{,}000$ lbs. for $d = 8.25$ ft., also passing through the origin, would satisfy this requirement. Such a curve is represented by the equation

$$P = 242d^{2.78}$$

and will intersect the curve

$$P = 1250d^2$$

for a value of d = 8.25 ft. This curve is plotted on Fig. 3 and, it will be noted, falls well below the plotted points of the Raleigh tests.

Rounding out the coefficient and exponent, this formula is put at

$$P = 250d^{2.75} \qquad (1)$$

for the purpose of this study. This formula applies for "Good to Best" soils, and therefore the corresponding formulae would be:

$$P = 125d^{2.75} \text{ (for "Average" soils)} \qquad (2)$$

$$P = 60d^{2.75} \text{ (for "Poor" soils)} \qquad (3)$$

In Table 1 all pertinent dimensions are calculated for poles of all classes varying from 25 to 90 ft. in length, on the basis of standard depths of setting. For a given depth of set, the value of x is constant, and the value of y can be obtained for any length of pole with given set by making the necessary adjustment for length. For example, from Table 1 the values of x and y for a 50-ft. pole, set 7 ft. in the ground, are 3.92 and 43.36 ft., respectively. If a 70-ft. pole is set 7 ft. in the ground, the values of x and y would be 3.92 and 63.36 ft., respectively.

Table 1 is used in reducing values of P, found from the equations (1), (2) and (3) to W, the breaking load applied at a point 2 ft. from the top of the pole, viz.:

$$W = P\frac{x}{y}$$

This has been done in Fig. 4, 5 and 6, respectively, for poles of Classes 1 to 6, inclusive, and of the following lengths: 25, 35, 50, 70 and 90 ft., for "Good to Best," "Average," and "Poor" soils. The intersection of the horizontal "Class" lines with the curve representing the particular length of pole in question gives the proper depth of set for the character of soil assumed, not only to develop the strength of the pole, but also to avoid excessive angular displacement. Values for intermediate lengths of poles may be determined by interpolation.

Table 1.—Dimensions for Different Depths of Set and Lengths of Poles Corresponding to Fig. 1 (a)

Length of Pole Ft.	d (Ft.)	b (Ft.)	c (Ft.)	g (Ft.)	x (Ft.)	y (Ft.)
25	5.0	1.62	1.69	1.10	2.79	19.69
30	5.5	1.78	1.86	1.22	3.08	24.36
35	6.0	1.94	2.03	1.34	3.37	29.03
40	6.0	1.94	2.03	1.34	3.37	34.03
45	6.5	2.10	2.20	1.44	3.64	38.70
50	7.0	2.27	2.37	1.55	3.92	43.36
55	7.5	2.43	2.54	1.67	4.21	48.03
60	8.0	2.59	2.70	1.78	4.48	52.71
65	8.5	2.75	2.87	1.89	4.76	57.38
70	9.0	2.91	3.04	2.00	5.04	62.05
75	9.5	3.08	3.21	2.11	5.32	66.71
80	10.0	3.24	3.38	2.22	5.60	71.38
85	10.5	3.40	3.55	2.33	5.88	76.05
90	11.0	3.56	3.72	2.44	6.16	80.72

In constructing the curves of Figs. 4, 5, and 6, the procedure is as follows: The character of the soil being assumed, take, for example, a 25 ft. pole, assuming any depth of set, say, for example, 5 ft., and putting this value of d in the equation

$$P = Cd^{2.75}$$

the value of P is determined. If the above equation is for "Good to Best" soils, the value of the constant C will be 250, which will give for P a value = 20,800. Now going to Table 1, we find the values of x and y for a 25-ft. pole set 5 ft. in the ground are 2.79 and 19.69, and applying these values to P in the equation

$$W = P\frac{x}{y}$$

we determine the value of W, which in this case would be 2,950 lbs. This means that a 25-ft. pole set 5 ft. deep in "Good to Best" soil would be stable for a horizontal load W, applied 2 ft. from the top, not exceeding 2,950 lbs. or, in other words, the pole could only be a Class 3 to 4 pole, if its strength were to be developed.

Now assume that the pole instead of being 25 ft. in length is a 30-ft. pole, set the same depth (5 ft.), in the same soil. Proceeding as before, the value of P is 20,800, but now we find the values of x and y are 2.79 and 24.69 ft., respectively, and this gives as the value of W only 2,350 lbs., indicating that the pole could be only a Class 4 to 5 pole to have its strength developed by a set of 5 ft. in "Good to Best" soil. By taking various depths of set for poles of any length, the values of W in each case are worked out as above, and the curves drawn, as shown in these figures.

In accordance with Amercian Standards Association classifications of poles, it is to be understood that the horizontal load W is applied at a point 2 ft. from the top of the pole, and its magnitude is such that its moment about the ground line is equal to the resisting moment of the pole at that point. If the pole is a Class 1 pole, W is equal to 4,500 lbs., and so on down for the several classes as shown on this page. Hence if W is always applied at the same distance from the top of any pole, it serves as a measure to compare the strengths of poles of various lengths and species.

If the law of variation of P as expressed by the equation

$$P = Cd^{2.75}$$

be accepted as approximately correct for

DEPTHS OF EMBEDMENT FOR POLES IN THREE CLASSES OF SOILS CALCULATED TO DEVELOP STRENGTH OF POLE IN ACCORDANCE WITH FORMULAE

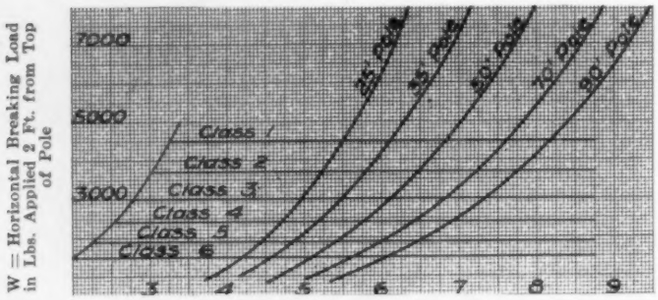


Fig. 4
Good to Best Soils

$$P = 250d^{2.75}$$

$$\text{or } W = \frac{140d^{3.75}}{(l\text{-}2\text{-}0.662d)}$$

Where
d = depth of embedment
l = length of pole

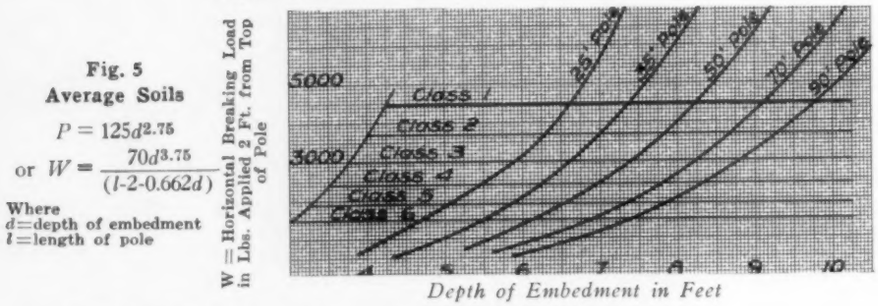


Fig. 5
Average Soils

$$P = 125d^{2.75}$$

$$\text{or } W = \frac{70d^{3.75}}{(l\text{-}2\text{-}0.662d)}$$

Where
d = depth of embedment
l = length of pole

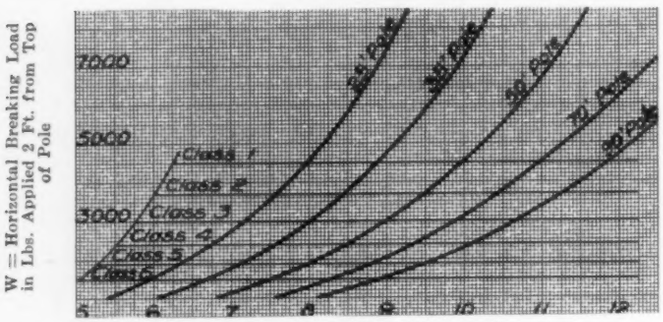


Fig. 6
Poor Soils

$$P = 60d^{2.75}$$

$$\text{or } W = \frac{33.6d^{3.75}}{(l\text{-}2\text{-}0.662d)}$$

Where
d = depth of embedment
l = length of pole

the setting of poles to develop their strength as well as to limit angular displacement, then the constant C may be determined by tests of very simple character, involving test posts or poles of but a single size, placed in typical soils along the route of a proposed line. The force P developed for one or more depths of set would determine the constant C_1 in the formula

$$P = C_1 d^2,$$

from which the formula

$$P = Cd^{2.75}$$

would be derived, C_1 being *equal to* $5C$.

Maximum unit pressures developed at the butts of poles may be calculated by the formula

$$p \text{ (tons per square foot)} = \frac{0.0031\,R}{d \times D}$$

Where d = depth of set in feet
D = average diameter of butt section in feet

$$R = P + (pounds)W$$

The pressures developed by the butts of poles in a given soil determine the angular displacement when a pole is subjected to transverse or overhanging vertical loads. The displacement is proportional to the unit pressures, which in turn are inversely proportional to the butt diameter. Thus, for example, if a pole of given butt diameter suffers an angular displacement of 10°, another pole set at an equal depth but of 10 per cent less butt diameter would, when subjected to the same overturning moment, suffer an angular displacement of 11°. This again illustrates the relative unimportance of butt diameters as a factor in pole stability, whether considered from a standpoint of displacement or complete overturning, and their remote application to the problem involved here.

The classes of coils considered here do not include such material as solid or loose rock, shales, etc., where poles might be concreted in. In such case good judgment should govern, particularly where short poles of high strength are used, and in other cases the limiting values of pressures developed should, of course, be those for compression perpendicular to the grain applying to the species of wood used. Where poles are concreted in granular or compressible soils, there is little if any saving in depth of excavation secured, nor is stability appreciably increased unless the diameter of the mass of surrounding concrete is from two to three times the diameter of the butt section of the pole. As the quantity of concrete is increased, its weight becomes a factor in increasing stability, and resistance to angular displacement is increased.

Where it is necessary to preserve first-class alignment and minimize angular displacement, and at the same time desirable to reduce depths of setting, it is convenient to remember that for the average pole properly set, the same butt pressure will result if the depth is reduced somewhat less than 5 per cent for an increase of 10 per cent in the diameter of the butt. For equal stability, however, account must be taken of the fact that as the depth of set decreases, the capacity of the soil to resist pressure also decreases, so that there should be an increase of approximately 10.5 per cent in diameter for each 5 per cent decrease in depth, computed progressively. Very roughly this indicates that for a decrease of 25 per cent in depth of set, the diameter of the butt section would have to be nearly doubled. In most cases such a reduction would render the pole unstable against overturning. The curves of Fig. 3 show that the maximum amount of reduction in depth of set would be only about 9 in., on the basis of embedment depths computed and shown in Figs. 4, 5 and 6.

Apparently it is much preferable to secure added stability through increased depth of set, and the principal advantage of concreting poles in compressible or granular soils is in securing a solid backfill around the pole butt, equal to or better than the original soil. Where this is done, and the depth of the hole slightly increased as well, there is a very material increase in stability, against both overturning and angular displacement.

The depths of set for developing the strength and preserving the alignment of poles as determined above are in general materially greater than have been heretofore considered proper, particularly for the shorter poles of high strength. At any rate, they are in most instances at such wide variance with customary standards, it is hoped sufficient interest will be aroused in the subject to bring about, through further investigation, a more satisfactory and scientifically correct practice than exists in this respect at the present time.

In view of the many important improvements in practically every phase of transmission and signal line design and construction, including better clas-

(*Continued on page 20*)

Tributary Exchanges and Trunklines

By F. J. Dommerque

This Is the Sixth Paper of the Series on "A Development Study of the Toll Center District," Wherein a Representative Group of Toll Center Exchanges Is Produced and Discussed.

Variety in Toll Center Districts

A toll center is usually a town preponderating numerically, commercially, politically or geographically in the district. There may be several of the above mentioned qualifications which give the town its importance. It is also influential upon the character of the toll center as well as upon its district, whether it is located near to a primary outlet or regional center; and furthermore whether the district is located in an industrial

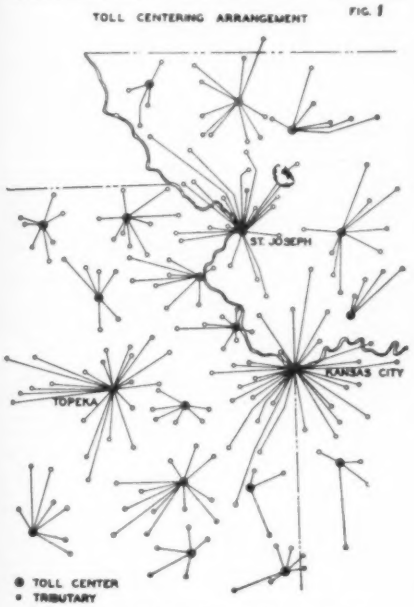


Fig. 1. Toll center districts in the Southwest.

or agricultural country or part of a country. The shaping of the district and its extension varies with the conformity of the country; it will be different in a flat country from that in a mountainous country; it will also make a difference whether it forms part of a densely or sparsely settled region.

In the exchanges of a district located in an area surrounding a regional center the telephone traffic is not as uniformly distributed as in the exchanges belonging to a toll center away from the influence of the large cities. In short, there are no end of varieties of toll center districts and it seems an impossible task to select of the 2500 toll center districts in this country one which would be most representative and which could serve as a basis for a development study, which must represent all important features of the multitude of toll center districts in order to be able to serve as guidance in the study of any district whatever.

For sake of illustration we present two figures showing the arrangement of toll center districts; Fig. 1 gives a number of toll centers with their tributary exchanges for a part of the territory covered by the Southwestern Bell Telephone Company, and Fig. 2 a more explicit arrangement of the toll center districts in the Chicago region. Fig. 1 is taken from a paper by C. C. McFarland on "Advance Planning of Long Distance Telephone Facilities" and Fig. 2 from a paper by Smith and West on the "Telephone Toll Plant in the Chicago Region." In Fig. 1 the toll centers are represented by large circles with a dot, and the tributary exchanges by small circles; in Fig. 2 the dots in the large circles are omitted. It will be noticed that in Fig. 1 the tributary exchanges are shown connected by direct lines to their respective toll centers. The direct lines, of course, do not indicate the actual routes, but only that all toll traffic goes over trunks to the toll center, while the connections in the Chicago territory are shown as they actually run, the dotted lines indicating open wire circuits and the full drawn lines cable circuits. All toll calls in the Chicago territory pass through a tandem board by the use of the A-B toll method. At present only one tandem board is provided for this toll business; this board is located in Chicago. The intention is to establish more tandem boards as toll traffic increases. This is of importance to obtain economical balance of line losses. In the Chicago tandem trunk plant the tandem trunks are divided into two groups, one group connecting the tandem board with the city offices and the other group connecting the tandem board with the exchanges in the outlying territory. A study of costs has shown that the most economical division of losses is obtained by allowing for the tandem trunks in the city limits 5 db., and for the tandem trunks in outlying territory 10.4 db. We will not go any further into the Chicago problem.

Representative Group of Toll Center District Exchanges

Not having at our disposal data as to arrangement of, and traffic, in the 2500 toll centers in this country to use as a basis for our study we are having recourse to a set of data, which has been collected and published by Dr. Schreiber, the chief of the technical division of the Bavarian telephone service, which forms a part of the German telephone system. We feel justified in doing this, because the character of the German people, of their country and customs as well as their proficiencies in industry in general and of telephone manufacture and operation in particular, comes as near to ours as any.

In the Bavarian toll service system

Fig. 2. Chicago territory toll system.

are 53 toll centers. Dr. Schreiber determined for the toll center districts the average number of the exchanges of the first and of the second order, the average number of subscribers in these exchanges and the average distances of the exchanges from toll center, etc. He then constructed with these average values an average toll district diagram, giving to each exchange in the diagram the average distance from the toll center, which consequently were located on a circle with the toll center as central point, as shown in Fig. 4. The diagram is reproduced with the circle of exchanges of the first order in a circle having a radius of 8.4 miles and the exchanges of the second order in a circle having a radius of 11.7 miles. This diagram we will adopt for the basis of our development study.

It will be noticed in this diagram that all exchanges are directly connected to the toll center, but that the exchanges of the second order are also connected

to the nearest exchange of the first order as indicated by the dotted lines. In the discussion of the tributary trunk lines we will take up both cases, direct connection, that is direct trunking of the exchanges of the second order to the toll center, and trunking via the exchanges of the first order. The lines shown in the diagram represent the distances by airlines; the actual distances are from 15 to 20 per cent longer, but for a study of the kind we are making, it is immaterial whether we use airlines or the circuitous actual lines.

Arrangement of Toll Trunklines

Toll trunks to a toll center may be for calls from a tributary exchange to another tributary exchange in the same district or for an exchange outside of the district. All calls may be handled at the tollboard in the toll center; in any case all calls for exchanges outside the district will pass through this toll board; the calls remaining inside the district may, however, be taken care of by a tandem operator. There may be an exception, where a tributary exchange of the second order may be in close proximity to a tributary exchange of the first order and it may be economy to trunk directly from the exchange of the second order to the exchange of the first order for calls for subscribers in the latter, and vice versa. Such cases have to be taken under consideration, as most likely there exist already lines between the two exchanges. It may also be advantageous for calls from the exchange of the second order for parties beyond the neighboring exchange of the first order to pass through the latter as then the circuits coming from the originating exchange may be extended from the exchange of the first order to the toll center on a common pole line or in some cases even make it possible to install a toll cable, which would not be warranted if the traffic from the exchange of the second order would not help.

It is not our intention to go into details on this matter, as every case has to be studied under its local circumstances, one of which is the present condition of the pole line and what is to be done with it at certain periods of, say, three to five years, whether parts of it have to be rebuilt, or extended or abandoned. This is a part of the so-called "program studies," in which the cost of alternative plans are ascertained, but which do not and can not form the object in view of our problem; we may, however, make one general statement, as follows: whenever the distance of an exchange of the second order to an adjacent exchange of the first order is equal to, or greater than, the distance to the toll center, trunking to or via the exchange of the first order is not economically justified.

With reference to running the toll trunks from an exchange of the second order to an adjacent exchange of the first order a saving in the number of trunk lines required between the latter and the toll center is only then effected, when the calls originating in the exchange of the second order for exchanges beyond the exchange of the first order are switched at the exchange of the first order as thereby a greater trunk group is obtained of a less number of trunks as when the calls from the exchange of the second order and the calls from the exchange of the first order are passed to the toll center in two separate groups. But this would mean an additional switching operation at the exchange of the first order, and practically making a tandem office out of it. This is, however, a commercial reason why the direction of calls from an exchange of the second order to an adjacent exchange of the first order over a direct trunk may be advisable, it depends on whether the toll rates are based upon airline distance or upon circuit mileage. If the latter basis is adopted it may happen that calls between the two neighboring exchanges may become more costly than calls from the exchange of the second order to the toll center or other offices farther away. Therefore the toll rates must be taken in consideration also. At this juncture it may be opportune to call attention to a policy lately followed in several European countries.

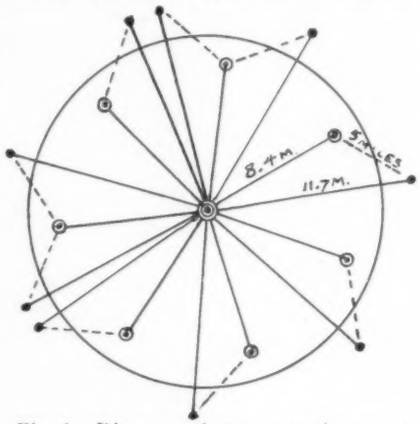


Fig. 4. Diagram of representative group of toll center district exchanges.

In the short-haul traffic the toll rates are made a multiple of the local rate, which in this case is a measured service rate. The rates increase by zones, the first zone rate for instance, being double the local rate, the second zone rate the triple of the local rate and so on. The toll charges are not recorded on tickets as now, but are registered automatically or by the operator upon the callmeter of the subscriber who originates the call. If such a method of charging for toll calls could be introduced in a toll center district, it would simplify matters considerably.

We repeat again that the technical and economical problems entering into the development study of each individual toll center district are numerous and must be solved individually for each district, but a discussion in a general way as it is undertaken in our study, should give an idea of the requirements and an indication how such a study can be made to bear fruit.

In all cases it will be necessary to first investigate the present facilities of lines and operating equipment as to their usefulness for the future, and compare the facilities found to be in satisfactory condition to last and give service for a period of years with the facilities required in twenty years and see how they will fit in.

EFFECT OF DEPTH OF EMBEDMENT ON POLE STABILITY

(*Continued from page* 18)

sification and preservative treatment of poles, better plant and line equipment, and better service in general, the fact that old rules of thumb still prevail in the setting of poles clearly seems to call for more careful consideration of this important subject.

We are especially indebted to Geo. J. Roewe, of the Carolina Power and Light Co., for the data on the Raleigh stability tests, and to S. B. Slack, bridge engineers of the Georgia State Highway Board, for test data on the stability of guard rail posts. The criticisms and suggestions of Dr. M. G. Lloyd, of the U. S. Bureau of Standards, have been most helpful in the preparation of the paper, and are gratefully acknowledged.

TELEPHONE COMPANY AT MILWAUKEE STARTS LAYING NEW CROSS-RIVER CABLE

The Wisconsin Telephone company has started operations in Milwaukee which will probably continue most of the winter to provide a new river crossing at Ninth street. When this river crossing is completed and hooked up to the system, it will eliminate the cable crossing at Tenth street bridge, which, in the past has occasioned the phone company considerable trouble due to the boats striking the cable and the difficulties occasioned when the city installed new protection cribs at the bridge.

The cost of the new river crossing at Ninth street is estimated at $43,000 by telephone company engineers.

THE TECHNICAL CLEARING HOUSE

B. C. BURDEN, Editor

Construction Tools and Vehicles

Q. What tools and type of vehicle are recommended for the small and medium size single unit telephone company?

A. The following list indicates those tools which every small and medium sized telephone exchange should have in order to be able to do first class work. The cost of having all of the necessary tools is more than offset by the greater speed and quality of work that these tools make possible.

Hole digging shovel (8′) (for pole hole digging)
Spoon shovel (for removing dirt from deep holes)
Round point straight handle shovel (for loose dirt)
Digging bar (useful in hard soil or going thru frost)
Tile spade (for trenching work)
Earth auger (8″) (for patent anchor holes)
Pike poles (for erecting heavy poles)
Wooden tamp with iron shoe (7′)
Raising fork (for use in erecting heavy poles)
Lag screw wrench (for pole line hardware)
Hand ax (for tree trimming, etc.)
Regular ax (for tree trimming, etc.)
Set of 6″ 3 sheave blocks with ¾″ rope.
Set of light blocks with Buffalo grips (for slack pulling)
Framing chisel (2″) (for gaining poles)
Carpenter's draw knife (for stripping poles)
One 40′ ½″ manila hand line (for general use)
Carpenter's claw hammer (for general use)
Linen or steel measuring tape (100′) (for general use)
Hand saw (for framing and gaining)
Carpenter's ratchet brace (for general work)
One kit of wood bits with extra bits size: ¾″x16″, 21/32″x18″
Payout reel (for wire stringing)
Takeup reel
Tree trimmer
Pair of improved Haven's grips (for messenger and guy wire)
Lineman's climbers, belt and safety
Klein side cutting pliers with sleeve twisters (8″)
Klein sleeve twisting clamps (for twisting up sleeves)
Electrician's canvas tool bag (for carrying tools on job)
Small masonry drills
Light extension ladder (28′) (Useful on installation and cable work)
12′ light ladder (useful for general installation work)
Heavy screw driver (for knob screws)
Test set
First aid kit
Miscellaneous items such as files, small screw drivers, long nose pliers, canvas bucket, etc.

Tools must be given the proper care otherwise the work will be slowed up and hazards to employees may result. Proper care embraces keeping the tools sharp and in good mechanical condition. Equipment such as lineman's belts and safety straps, hammer and ax handles, slack blocks, should all be inspected periodically to insure that a serious accident will not occur through a tool breaking or coming apart. Shovel handles can be kept from splintering by soaking in linseed oil occasionally. The practice of throwing sharp edge tools up to a lineman on a pole is a dangerous practice and is entirely prohibited by large companies. A canvas bucket and handline should be used in passing tools back and forth.

Construction-Service Cars

A small telephone company has need for an automobile for two purposes; viz., First, for construction work such as plant extensions and repair work; Second, for general service work such as station installations, trouble shooting, etc. For a company with less than 800 stations a light service car with a construction trailer will generally be found adequate.

The experience of many companies indicates that a light coupe equipped on one side with a rack for carrying shovels and lamps, and a compartment in the rear for carrying small tools and materials such as the wire, insulators, sleeves, test connectors small hand coils of iron and copper wire, a coil of drop wire, instrument parts, etc., makes an excellent all weather car for general service work.

For heavy construction work a two or four wheel trailer is used in connection with the service car. This arrangement permits transporting line materials, tools, etc., out on the job and then releasing the service car for other work.

A suitable trailer can be obtained at a small cost by buying an old set of running gears from an auto wrecking company and having a carpenter build a low bed with tool and material compartments on the side. The space in the middle is used for wire reels, and for hauling poles and heavy crossarms.

Hole Digging

Q. Every telephone man seems to have his own pet method of digging pole holes, please describe the standard method.

A. The following figure illustrates the method ordinarily employed.

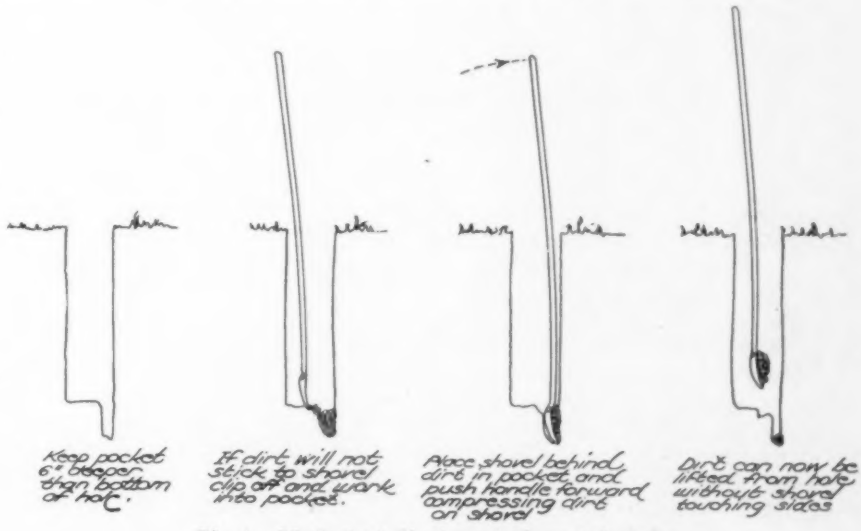

Keep pocket 6" deeper than bottom of hole.
If dirt will not stick to shovel clip off and work into pocket.
Place shovel behind dirt in pocket and push handle forward compressing dirt on shovel
Dirt can now be lifted from hole without shovel touching sides

Fig. 1. Method of digging telephone pole holes.

RENOGRAPHS

This department edited by Ralph C. Reno, field editor for Telephone Engineer. Your cooperation in making this section interesting will be appreciated. Bid him welcome and you will find a sympathetic listener. Impart your news cheerfully and we'll all feel cheered.–Editor

Visiting with telephone men—both operators and manufacturers — certainly gives one the true spirit of Americanism. Although the depression has taken and still is taking its toll in the industry, telephone men are bucking the winds with their heads up, characteristic of the spirit they have always shown.

* * *

Certainly they have experienced setbacks, but we haven't talked to a telephone man who has lost faith in the good old U. S. A. and its people. They know Uncle Sam will come back as he always has. All of them are looking into the future with the utmost confidence.

* * *

It's this atmosphere that makes contacting telephone men such a pleasant job. And—it's this spirit that has made the telephone industry the greatest business in the world. Other industries would do well to follow in its footsteps.

* * *

We dropped in to see those two progressive telephone executives, H. H. and M. W. Griswold, father and son and president and treasurer, respectively, of the Ontario Telephone Company, Phelps, N. Y. Among the many subjects discussed was the importance of state telephone associations. The Griswolds were in high praise of the work carried on by these bodies and pointed out how operating men are benefited by their activities. We agree with them wholeheartedly. Every company should be represented in its state association and should give it undivided support. These associations are truly the clearing house for new ideas and solutions to problems for the telephone industry.

* * *

While in Rochester, N. Y., we found that Stanley H. Manson, son of Ray H. Manson, Stromberg-Carlson Chief Engineer, formerly with the same company, has joined the Rochester Gas and Electric Corporation as radio manager.

* * *

A new recording system for assigning new telephones to cables and terminals has been inaugurated by the Rochester (N. Y.) Telephone Corporation, according to R. M. Bruce, plant superintendent. Mr. Bruce states that with the new system two and one-half days are saved from the time an order for a new telephone is received by the commercial department until it reaches the installers. This greatly speeds up service, which in the long run builds up good-will for the company. Managers interested in improving this department might get the details of the Rochester system and apply it to their own companies.

* * *

The Ogden Telephone Company of Spencerport, N. Y., has moved into its magnificent new home. The finest in buildings, housing up-to-date and modern equipment gives the Spencerport public telephone service that compares with that of any community of its size.

* * *

During a visit with R. E. Casselman of the Sanborn Home Telephone Company, Sanborn, N. Y., we learned that, in addition to this telephone work, he owns and operates a printing plant. Not only does Mr. Casselman do all the telephone company's printing, but practically all that is done in his community. Surely, a wonderful adjunct to the telephone business.

* * *

We certainly enjoyed our visit with J. H. and Llyod Wright of Jamestown, N. Y. Here are two men that put a great faith in advertising in local papers. They have migrated from the standard type of display newspaper advertisements and instead have a column headed "'Telephone Cross-Talk," written by Eunice Varley Carlson, which consists of news of the telephone company, explains policies and practices of the company, tells of any improvement added to its property, intimate news sketches on operators and employes, rates for long distance calls, book reviews and countless other features that have made a big hit with the Jamestown public. The column contains everything that can be put into display ads, but it is written in a more interesting and intimate style than the average run of advertisements. After looking over some of the columns we can see, Mr. Wright, why they have such a big following.

The Ashville and Panama Tel. and Tel. Company of Jamestown, N. Y., has been doing considerable line and pole construction, according to A. H. Appleby. All lines of the company will be repaired and put in proper condition, he stated.

* * *

Rambling over into Pennsylvania we stopped to visit L. C. Whiting at Meadville. Mr. Whiting is putting up a successful fight in keeping his station loss to a minimum, although most of the Butler factories are closed down and the Erie Railroad shops are at a low peak as far as employment is concerned. His loss is still under 10 per cent, which we find is the average loss in the territory we have covered.

* * *

Oil City seemed to be one of the liveliest places we have hit on our route. And—our impression must be correct because we were told by two or three parties there that Oil City and community has not been as hard hit as many other localities. Which all goes to prove that there are quite a few automobiles, airplanes and motors still burning up plenty of oil.

* * *

While in Oil City we had a long talk with W. S. Paca, a well known figure in the telephone industry and one of the incorporators of Telephone Engineer Publishing Company. Mr. Paca, who recently received the Pioneers gold badge for completing 50 years' service in the industry, had all the confidence in the world in future business and gave as a remedy for business ailments — good, honest hard pluggin', confidence and determination. We second the motion.

* * *

Had quite a time finding W. M. Bashlin Company of Grove City, manufacturers of linemen's safety belts, as they have moved into new quarters. We finally located them in their new, and, we must say, a pleasant home. Mr. Bashlin happened to be out on a business trip, but we had a nice chat with his assistant, Mr. Shell. We were glad to find that their business is holding up well, considering present conditions.

* * *

Our next stop was at Slippery Rock, home of one of the State Teachers Colleges. Conversing with A. L. Cooper and Dr. W. W. Barber, president and secretary, respectively, of the Slippery Rock Telephone Company, we were told that they had done considerable pole and line construction work on account of widening of state roads. We also found that their station loss was not as great as in other communities.

Telephone Activities in Foreign Countries

Dispatches from Abroad Keep Telephone Men in United States Constantly Informed Concerning Telephony of the World; Domestic Telephone Problems Oftentimes Can Be at Least Partially Solved by Watching the Outcome of Experiments Made Elsewhere

Radio Operations of Royal Canadian Signals

During the fiscal year ended March 31, 1932, The Royal Canadian Signals had in operation 24 radiotelegraph stations and five radio beacon stations. Installation of short wave equipment at each of the Northwest Territories and Yukon stations increased the efficiency of the service and permitted schedules to be maintained between Winnipeg and Edmonton for the transmission of traffic to Ottawa. Frequencies found to be entirely satisfactory on this system.

At Ottawa the low powered experimental short wave equipment has been replaced by a Marconi 2 K.W. set, which has greatly added to the efficiency of the station. An R. C. A. F. Photographic Expedition to the Belcher Islands, Hudson Bay, in 1931, maintained contact with Ottawa, thus proving the practicability of using light weight portable equipment for communication with isolated detachments operating in the northern hinterland. Low powered short wave transmitting and receiving sets have been issued to Divisional Signal Units located at various points throughout Canada

---

Cafe Telephones in Newcastle-on-Tyne (England)

Messrs. Binns, Ltd., have introduced into their Market Street Cafe a telephone system which is claimed to be the first of its kind in the North of England. From any of the 110 tables in the cafe it is possible to receive and make local and trunk calls, and also to telephone any of the departments in the store.

Probe of Philippine Communication Ordered

With the three-fold purpose of effecting economy, increasing efficiency, and simplifying the methods in the operation of the different electrical communication systems and services in the Philippines, especially where there are two or more systems or where there are parallel communication lines of two or more companies, Governor-General Roosevelt recently issued an Executive Order creating a committee to study ways and means of coordinating electrical communications systems throughout the Philippine Islands. The committee, which will study principally the operation of the telegraph and long-distance telephone companies in the Islands, is composed of Juan Ruiz, Director of Posts, Chairman; Jose Paez, Manager of the Manila Railroad Company; and J. E. H. Stevenot, Vice-President and General Manager of the Philippine Long Distance Telephone Company.

Operations of Swiss Communication for First Half 1932

Swiss postal, telegraph and telephone operations for the first six months of 1932, with comparative figures for 1930 and 1931, were as follows: (One Swiss franc equals $0.193)

Revenue Derived from Portuguese Government Telephone Service in 1931

totaled 9,572,000 escudos, of which 3,644,000 escudoes were derived from local calls and 5,928,000 escudoes from interurban calls. (The Escudo averaged $0.0424 in 1931.) Interurban calls over the Government lines in 1931 totaled 1,585.504; incoming international calls, 29,144; and outgoing international calls, 24,554.

New Radio Circuit Opened Between the U. S. and Haiti

A new transoceanic radio-telegraph circuit connecting New York with Port-au-Prince, Haiti, was officially opened July 1 by R. C. A. The circuit is 1,500 in length. The concession granted the company by the Haitian Government also includes the right to operate other international circuits, and to establish service connection the island with ships at sea and planes in the air.

New Telephone Station in Morocco

A concession has been given to the Compania Hispano-Radio-Maritima for the installation of a radiotelegraphic and telephone service in Arzila, Spanish Zone. The power of the station is to be 250 watts and the wave length from 150 to 160 meters. The concession is for five years. The communication is desired especially for sending messages to fishing craft off the western coast of the Protectorate.

Further Plans Laid for Proposed Trans-Canada Toll System

Seven large Canadian telephone systems were represented at a meeting held at Regina, Saskatchewan, recently, for the purpose of perfecting plans for a Trans-Canada telephone toll system for the interchange of business between the different units throughout Canada and to establish "through" toll lines from Halifax, Nova Scotia, to Victoria, British Columbia.

Those systems represented were the Maritime Telegraph & Telephone Co., Ltd., the New Brunswick Telephone Co., Ltd., the Bell Telephone Co. of Canada, Ltd., the Manitoba Telephone System, and Saskatchewan Government Telephones, the Alberta Government Telephone, and the British Columbia Telephone company.

Buenos Aires Telephone Strike Resulted in Damage to Telephone Plant

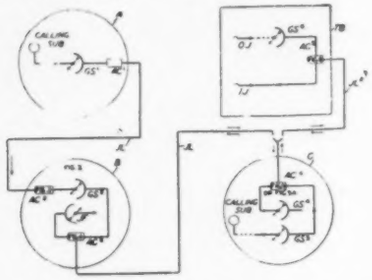
The telephone strike in Buenos Aires, which was settled the middle of July after having lasted 50 days, caused considerable damage to the outside plant of the Union Telephone Co. It is expected that about 180 men will be tried for sabotage. During the strike about 12 per cent of the staff of the company abandoned work. In commenting upon the extensive damages the general manager of the telephone company stated as follows: "To give a concrete picture of the formidable task which the company has been called upon to accomplish because of sabotage, as compared with the normal demands of the service, it is interesting to observe that the 178 main underground cables and 4,528 distribution and aerial cables that were out during the strike represented a greater volume of repair work than the Union Telefonica ordinarily would have to carry out in seven years and five months. At one time or another in the course of the strike a total of 160,338 subscribers suffered interruption of service due to cable damage, a majority loss of communications."

The Latest Telephone Apparatus Patents

A Description of Outstanding Patented Inventions on Telephone, Amplifying and Acoustics as They are Granted by the United States Patent Office. This information Will be Found a Handy Reference for Inventors, Engineers and Plant Men in Establishing Dates of Record, Etc.

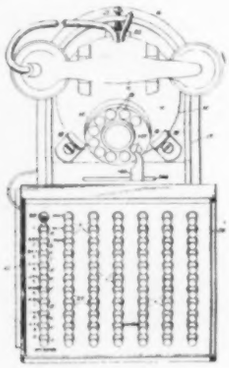
Conducted by
BEN. J. CHROMY
Patent Attorney
Washington, D. C.

1,881,273. TELEPHONE SYSTEM. Leslie B. Haigh and Henri E. A. Borzer, Paris, France, assignors to Western Electric Company, Incorporated, New York, N. Y., a Corporation of New York. Filed Feb. 12, 1932, Serial No. 592,490, and in Switzerland Jan. 7, 1931. 8 Claims. (Cl. 179—16.)



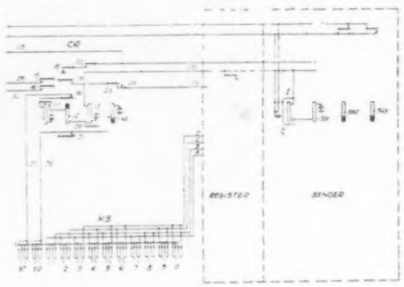
1. In a telephone system, a line, means at one end of said line responsive to direct current signals for conversion into and transmission of alternating current signals over said line and means at the other end of said line responsive to said alternating current signals for conversion into and transmission of direct current signals beyond, said last mentioned means being responsive to a preliminary short alternating current signal to prepare it for the reception of succeeding alternating current signals for conversion into direct current signals.

1,882,106. TELEPHONE APPARATUS. Nathan Wise, deceased, Mount Vernon, N. Y., by Aaron W. Levy, executor, Brooklyn, N. Y., and Pearl L. Wise, executrix, Mount Vernon, N. Y. Filed May 1, 1931. Serial No. 534,303. 21 Claims. (Cl. 170—90.)



1. In a telephone apparatus, an impulse transmitter adapted for successive operation in the transmittal of impulses corresponding to successive characters of a telephone number and including a rotatable finger wheel having a finger-receiving opening, actuating means for said transmitter including an arm having a finger cooperating with the finger-receiving opening of said finger wheel, character-selecting switch means, and automatically actuated means responsive to the operation of said switch means for successively controlling the operation of said impulse transmitter actuating means according to the successive characters of a telephone number.

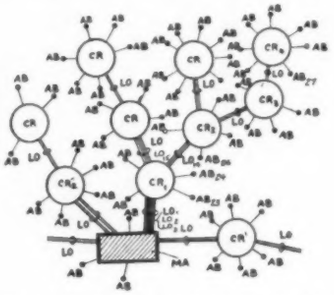
1,883,589. TELEPHONE SYSTEM. Thomas F. Crocker, Chicago, and Victor S. Tharp, Elmhurst, Ill., assignors, by mesne assignments, to Associated Electric Laboratories, Inc., Chicago, Ill., a Corporation of Delaware. Filed Dec. 18, 1930. Serial No. 503,164. 32 Claims. (Cl. 179—27.)



1. In a telephone system, a toll switchboard, a toll line incoming to said switchboard, a hunting switch terminating the toll line and controlled thereover, a link circuit at the switchboard accessible to said hunting switch, a directively controlled switch individual to said link, and other toll lines and toll service trunk lines accessible to said second switch.

1,885,491. AUTOMATIC TELEPHONE SYSTEM. Michel Tchoubritch, Paris, France, assignor to Societe Nouvelle de Constructions Telephoniques, Paris, France, a Corporation of France. Filed Jan. 24, 1931, Serial No. 511,041, and in France Jan. 31, 1930. 20 Claims. (Cl. 179—27.)

1. In a telephone system of the type including a manual main exchange and several automatic rural exchanges with which subscribers are connected, each of the latter being equipped with local battery telephones having magneto ringing



means, and wherein each rural exchange is connected with the manual exchange by trunk lines, some directly and the others through the intermediary of less remote rural exchanges, the combination in each rural exchange of main trunk lines leading towards the manual exchange, transformers inserted in said lines, the primary and the secondary of which are each constituted by two windings separated by a condenser; secondary trunk lines leading towards the more remote rural exchanges, and crossing the outer main trunk lines on their outer side opposite the transformers, subscriber's lines crossing the main trunk lines on that side thereof on which the transformers are located; a local line crossing the said subscribers' lines and the said secondary trunk lines; relays responsive, some to the operations of the subscribers, and some to the operations of the manual exchange, and including local communications and communication relays, calling relays and observation relays; means responsive to the operations of said relays for connecting the lines crossing each other, and a calling line finder and an individual selector for each main trunk line.

1,885,432. TELEPHONE BOOTH. Ole Gullicksen, Chicago, Ill., assignor to Churchill Cabinet Company, Chicago, Ill., a Corporation of Illinois. Filed Sept. 15, 1930. Serial No. 481,859. 2 Claims. (Cl. 20—35.)

2. A telephone booth comprising a floor, side walls, rear wall and ceiling, each constructed of a plurality of contacting layers of laminated wood, a door frame secured to said side walls and ceil-

(Continued on page 26)

Elkhart, Kansas Cuts Over to Kellogg

Western Telephone Corporation of Kansas Purchases a New 3-Position Kellogg Switchboard For Exchange at Elkhart in Connection With a Program of Complete Rehabilitation. Assure Subscribers Modern, Efficient Service

By W. C. STREHL
Representative
Kellogg Switchboard & Supply Company

"Believing Elkhart deserves telephone service correspondent to its steady growth and promising future, the Western Telephone Corporation is making a sincere, earnest effort to give the city a first class exchange with up-to-the-minute service," said Mr. H. J. Clark, vice-president and general manager of the company, in commenting on the completion of the new building and installation of the modern, new Kellogg switchboard and the cutover to common battery service.

The Elkhart telephone exchange was started in the spring of 1924 when the town was still in "rompers." C. E. Gilmore started the exchange with 20 subscribers, but soon added many more and connected up several farmer-owned lines. He developed and operated the exchange until the spring of 1917 when he sold it to Mr. V. L. Newson.

Mr. Newson built up the exchange considerably in the following nine years. He added a second section to the switchboard and had nearly 200 subscribers in the town before selling the property to C. H. Smith in 1926. Mr. Smith owned the exchange only a short time, but added more subscribers and a third switchboard section. He sold the exchange in 1927 to T. A. Singer, who bought several other exchanges including Guymon, Boise City, Goodwell, Keyes and Spearman.

When the Western Telephone Company bought the exchange in August, 1929, approximately 300 city phones were in use. This number has since been increased to more than 375, with over a hundred rural subscribers.

Since purchasing the Elkhart exchange from T. A. Singer and assuming control August 1, 1929, the Western Telephone Corporation has expended approximately $25,000 on improvements and equipment. This includes a new building of modern design, a new Kellogg common-battery switchboard replacing the old magneto type, new outside cable, new drops and interior wires, and new residence and business telephones.

A Kellogg 3-position switchboard was chosen by the Western Telephone Company officials as the most logical equipment for the improvement of this system. The company has had experience with Kellogg equipment in their other exchanges. The new switchboard is arranged for an ultimate capacity of 800 lines, and is wired and equipped for 400 common battery lines, 10 toll lines and 20 rural lines.

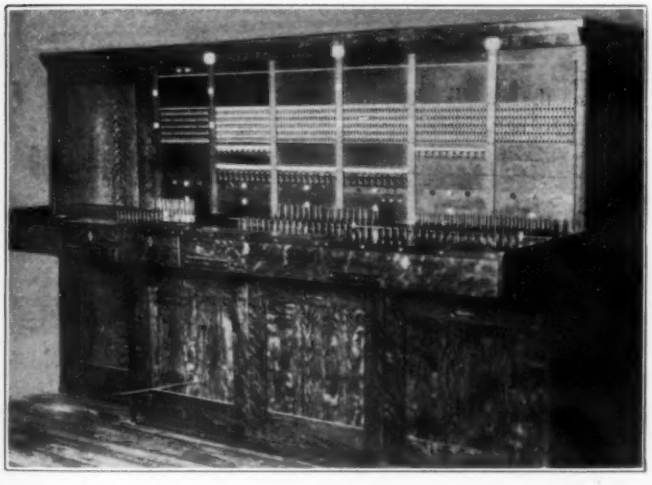
The cut-over from the old magneto to the new common equipment in the recently completed exchange building was made without a single interruption.

The Western Telephone Corporation of Salina, Kansas, and its subsidiaries own and operate some 54 telephone exchanges in Kansas and a total of 167 exchanges in six middle western states. With interconnecting lines to all large systems in the nation, the company is able to furnish quick long distance connections to all parts of the United States and to many foreign countries.

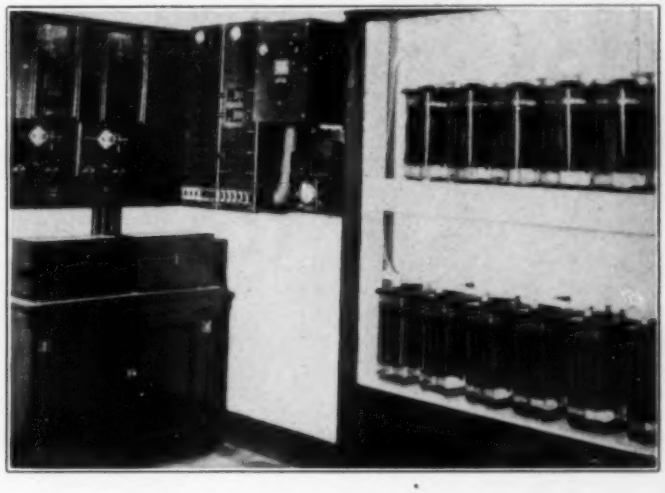
A graphic example of the ability and determination of the Western Telephone Corporation to render efficient service at all costs occurred when toll service between Elkhart and out of town points was restored within a half hour after central cables had burnt in two when the Keinath Skating rink burned to the ground. The first call that went out to Elkhart following restoration of long distance service brought a crew of 30 line and service men from Boise City, Guymon and Spearman to rush the job of restoring complete telephone service in Elkhart.

Clarence Hanson was notified of the fire almost as soon as it was discovered and he hastened to the telephone office to be ready for any emergency. The new building and exchange is across the street from the burned building and would have been endangered had the wind been in another direction. Important cables strung down the alley hung within a few feet of the burning building and were soon severed by the terrific blaze. The break in the cables threw an overload on the remaining cables and burned out fuses in the cable room at the exchange, killing service on nearly half the phones in Elkhart. Hanson and his assistants got busy at once stringing emergency lines and were able to cut over and get out of town service re-established within 30 minutes after the cables went out.

Hanson called L. L. Dewey, district manager at Guymon for help and Dewey with the help of Harry Bybee, another

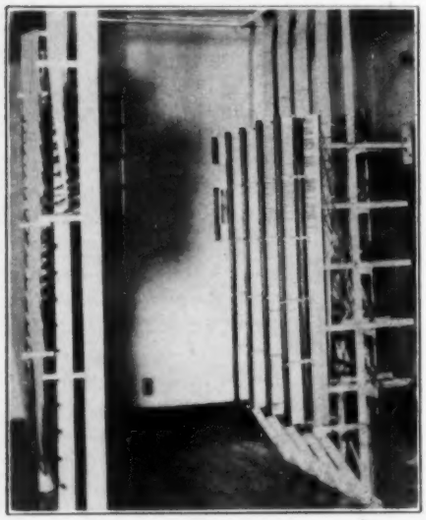


New Kellogg Three Position Low Type Common Battery multiple switchboard installed in the Western Telephone Corporation's new building at Elkhart.



Power Equipment showing battery cabinet doors open. Note twin Kellogg Pole Changers and Ampere Hour Meter Which Automatically Starts and Stops Tungar Rectifier.

official who was in Guymon, rounded up crews at Boise City, Guymon and Spearman and rushed them to Elkhart. The crews arrived in Elkhart about 2:30 in the morning and worked for three hours and had started back by 6 o'clock. Lee Edgerton, expert cable splicer for the district and Art Riley of the Elkhart force, continued the work all day and most of the night before all the Elkhart phones could be put back



Main Frame and Kellogg Line Relay Rack in Terminal Room of new building at Elkhart, Kans.

in use. Edgerton had been up three days and two nights before completing the splicing job here, having worked all night on an emergency splicing job at Boise City, before being called by Dewey to hurry to Elkhart.

Including its capable manager, Clarence Hanson, who has worked up to his present position from a job as clerk in the telephone department of the Salina offices, the company employs six persons in the Elkhart exchange.

Mr. Hanson, in the nine months or more he has been at Elkhart, has done much to win respect for the company. The personal visits of W. Clark, the district manager, and other officials of the company, have had a desirable effect on the public relations between the community and the exchange.

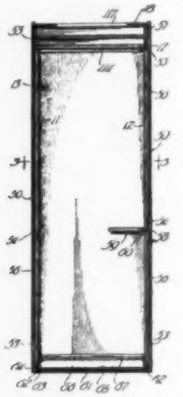
The first sales drive that the Western Telephone Corporation instituted, resulted in the Elkhart exchange leading the entire state of Kansas with 75 new installations. Elkhart again won the state banner in the expansion campaign last fall, and another plaque of honor will be sent to hang on the walls of the new building.

The company is well pleased with its Elkhart investment, and sees a splendid future growth of the town and in its business. The community is provided with a vastly improved service and the present policies of the company indicate that this exchange will permanently remain one of the finest small city exchanges in the southwest.

THE LATEST TELEPHONE APPARATUS PATENTS

(*Continued from page* 24)

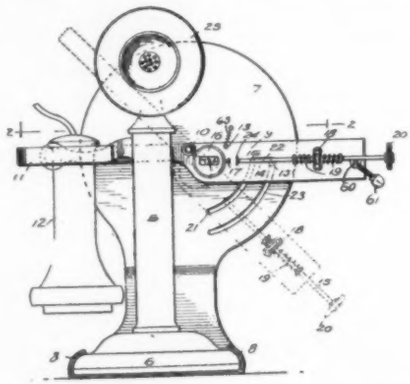
ing, a door carried by said frame, a pair of detachable panels carried by said side walls, and a second ceiling carried by



said walls and spaced from the first mentioned ceiling, said ceilings having staggered air vents.

1,883,549. TELEPHONE REGISTER. David M. Carr, Brooklyn, N. Y. Filed May 31, 1930. Serial No. 458,277. 20 Claims. (Cl. 179—7.)

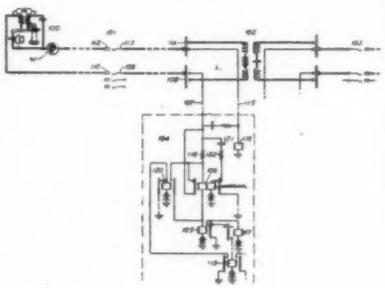
1. A movable guard to prevent easy manual movement of the telephone switch when said receiver or combination transmitter and receiver is off its



hook or cradle of any suitable material normally secured in a position which will prevent the removal from its switch hook or cradle, of the receiver or combination transmitter and receiver of a telephone instrument without first moving the guard.

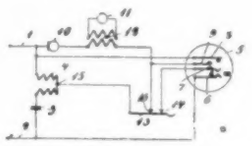
1,882,851. TELEPHONE SYSTEM. William H. Matthies, Hackensack, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a Corporation of New York. Filed Oct. 15, 1931. Serial No. 568,927. 14 Claims. (Cl. 179—16.)

1. In a signalling system, a responsive device, means for establishing operating circuits of different resistance to said responsive device, means operative over said circuits for determining whether a particular established circuit is of relatively high or low resistance, and means



controlled by said means for rendering said responsive device less responsive if said circuit is found to be of low resistance.

1,877,678. CIRCUIT ARRANGEMENT FOR AUTOMATIC TELEPHONE SYSTEMS. Fredrik Markman, Stockholm, Sweden, assignor to Telefonaktiebolaget L. M. Ericsson, Stockholm, Sweden, a Company of Sweden. Filed Sept. 24, 1929, Serial No. 394,887, and in Sweden Mar. 7, 1929. 4 Claims. (Cl. 179—81.)



1. In a substation telephone circuit two fine conductors, a bell bridge with a condenser normally shunted to said conductors, a telephone hook switch and an impulse sender, the impulse contact of said impulse sender being adapted to short-circuit a portion of said bell bridge including the condenser over contacts of the hook switch.

NEW BILLING PLAN FOR PHONE CO.

A new plan for preparing and distributing telephone bills was instituted by the Bell Telephone Company of Pennsylvania in Pittsburgh, Pa., recently.

The new billing plan was fully explained in a booklet which accompanied all October 1st telephone bills. The new system calls for type written bills, which makes them neater and more easily understandable than the heretofore handwritten statements.

What Is Your Company's "Score" On Troubles Cleared The Same Day?

A RECENT impartial investigation of several telephone companies showed that telephone company income varied in direct ratio to the promptness with which troubles were cleared.*

One of the most successful companies showed a record of 93 per cent of troubles cleared the same day. How would your company's "score" compare with this record?

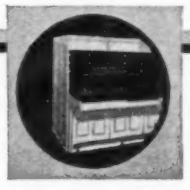
Don't *guess* as to the nature and location of line troubles. Put the West Test Set to work and note the difference — in money saved — in quicker work — in improved condition of your lines and in greater satisfaction of your subscribers.

Don't delay. Find out for yourself why scores of telephone companies have adopted West Test Set as standard equipment. Order one or more — today.

*"Telephony", Nov. 12, 1932, issue.

The West Test Set is a combined portable telephone and testing instrument. Locates all line troubles quickly and efficiently. Send for Bulletin 1606.

In addition to West Test Sets, American Electric Company offers a complete line of telephone exchange testing apparatus including Wire Chief's Test Desks, Wire Chief's Test Turrets, Controlled Current Test Sets, Magneto Transmission Test Units, Cable Testers, Test Bells, Test Meters and Hand Test Telephones. Full information sent upon request.



American Electric Company

Distributors of Everything Necessary for the Construction and Maintenance of Telephone Properties
Engineers, Designers and Manufacturers of Manual Telephone Exchange Equipment
CHICAGO, U. S. A.

Exclusive Sales Agents in United States and Possessions, American Automatic Electric Sales Company, 1033 W. Van Buren Street, Chicago, U. S. A.

Exclusive Export Distributors, Automatic Electric Sales Company, Limited 1027 W. Van Buren Street, Chicago, U. S. A.

These "Wet Joints" are Not Joy-Makers Dillon Effects Cure

It has been common knowledge to telephone engineers and cable splicers for years, that the finest appearing wiped joints are only too often a snare and a delusion. They look all right, solid as the rock of Gibraltar. You can't find any pores in them with a magnifying glass, but when the ends are smeared with goo, and they get their shot of oxygen, zowie, the kid's soap bubble pipe has a real rival.

And the joint was not wiped yesterday, last week, or the month before, but a long time ago. Those minute little passages have been allowing moisture to work through the solder and into the sleeve; whereupon old man trouble in the course of time takes full charge of his wet joint.

And whose fault is it that this joint leaks? Try and find out—you are good if you do. It may have been Splicer Bill, Jack or Ed, who knows? He may be dead. In the meantime there are tens of thousands of citizens, annually, including some good ones, who would gladly shoot at sunrise the cable man responsible for that leaky joint which put the cable out of commission serving their neck of the woods.

Up to now we have been handing it to Bill the Cable Splicer, "sorter' rough, haven't we? Sure, we have been blaming it all onto him, and being a good hombre he has just bowed his back and stood for it. Says the old kid himself, after a case of trouble, to the big chief, when he hits the carpet: "sure, I ladled that joint, and it looked 100% perfect when we pumped the water out of the manhole and I examined it before opening. Why it leaked, boss, is beyond me."

Yes; and why they leak, when they look so perfect, has been just one of those things we have been unable to figure for these many years, we old time jugglers with the wiping rags, who have sweat, bled and been fired, over these cantankerous fine looking, but siphoneous joints.

And now the boys with the metal slant for the dig deep stuff, I arise to say you have been "all wet" through these long years in testing the temperature of your solder with a twist of paper. For one time right, you are many times wrong. Proving through experimentation conclusively that a perfect joint depends upon the wiping solder being at the scientifically correct temperature while the joint is being wiped.

Fine; we are glad they have found out what the "Rastus in the wood pile has been", but how are we to check the temperature to know it is correct? Well, buddies, that's where Uncle Bill slides into the picture. Every since I found out about this temperature racket, the old bean has been working to find out the antidote. Instruments of various kinds and descriptions (they run from twenty-five bucks to around a hundred smackers), and in sizes from a camera to a home movie machine, and so delicate! they need as much attention as your speech to your wife, the morning after the night before.

Well, that wasn't so hot. Too delicate. Not portable, and the cost too high. So I just got busy, and believe it or not, I am manufacturing for you an instrument that is 1"x8" calibrated so that when it is immersed into the solder a dial hand stands at O. K. when the solder is at the scientifically correct temperature. When this temperature is attained and the joint properly wiped, no leaks will appear. The hand also registers too hot, or too cold, as the case may be. And now get this ear full: you can drop it off of your arial platform, slam it on the floor, pile your tools on top of it, and it will not injure it in any way, or cause it to lose its correct calibration.

That's my story; and this testing device is now on the market as you will note, from the advertisement in this issue. Dillon Manufacturing Company, Suite 1218, 63 East Lake Street, Chicago, Ill.

AIR-TIGHT WIPED JOINTS
NOW ASSURED

THE DILLON TEMPEROMETER

Assures wiping solder being heated to 100% correct temperature.

POORLY WIPED JOINTS INEXCUSABLE WITH THIS INSTRUMENT

To properly wipe a joint the solder must be at the correct temperature. Guesswork is a poor and costly method when a TEMPEROMETER will quickly and accurately check the temperature, showing when it is just right for use.

TELEPHONE COMPANY:
SAFEGUARD YOUR CABLE JOINTS

CABLE SPLICER:
SAFEGUARD YOUR JOB

Simply stick the end of the TEMPEROMETER in the metal, and when it registers O K on dial the temperature of the solder is scientifically correct.

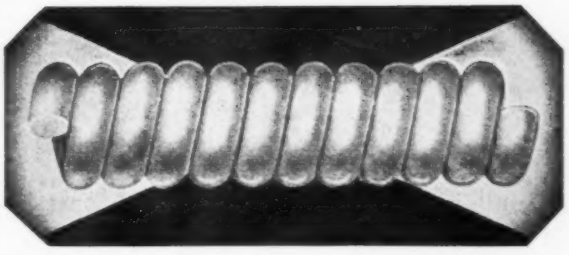
THE DILLON TEMPEROMETER IS SIMPLY CONSTRUCTED

measuring 1" x 8" and strong enough to be used as a police "billy" yet delicate enough to register accurately.

LOW IN PRICE. SOLD ON MONEY-BACK GUARANTEE.

If the instrument is not entirely satisfactory your money will be refunded—No explanation necessary. Write today.

DILLON MFG. CO.
SUITE 1218—63 E. LAKE ST.
Chicago, Illinois



Galvanized Telephone Wire and Steel Strand

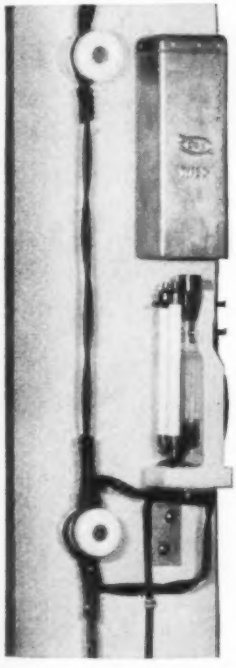
Crapo Galvanized Wire can be wrapped around its own diameter without injury to its pure zinc coating.... That is one of a number of reasons why **Crapo** Galvanized Telephone Wire and Strand can be depended upon to reduce maintenance cost.

Look for the **Crapo** Seal!

Indiana Steel & Wire Co.
Muncie, Indiana

Crapo
GALVANIZED PRODUCTS

COOK INDOOR OUTDOOR



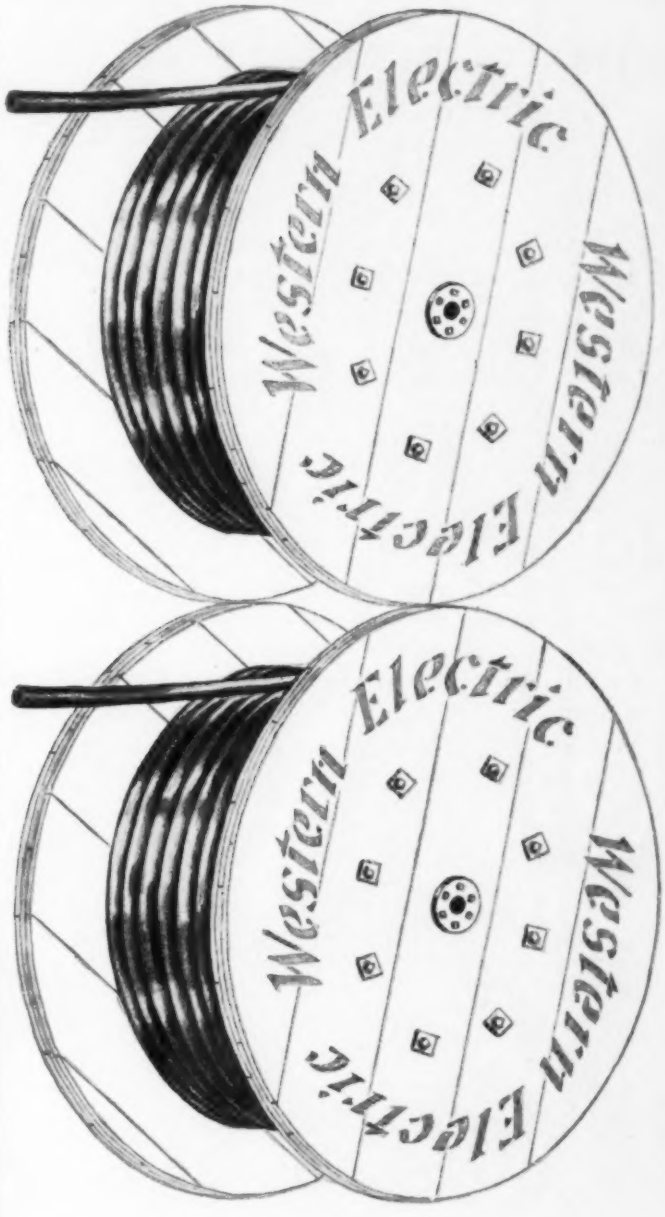
STATION PROTECTOR
TYPE O-7

Mounted outdoors it keeps high potential out of subscriber's premises.

Adequate protection at low first cost and low maintenance cost.

Always accessible when mounted outdoors.

MANUFACTURED BY
COOK ELECTRIC COMPANY
2700 SOUTHPORT AVENUE CHICAGO, ILLINOIS



CABLE...
and 60,000 other items

The guarantee of quality implied by the name Western Electric on Western Electric lead-covered cable has long been recognized by the telephone industry. But equally important is the additional endorsement of Graybar—an endorsement that insures the quality of 60,000 electrical items.

GraybaR

OFFICES IN 76 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., N. Y.

New Equipment at Taft, Texas

Western Telephone Corporation Installs Stromberg-Carlson Equipment—Improvements Give Taft and Vicinity First Class Service

By P. Winemiller
Sales Engineer
Stromberg-Carlson Telephone Mfg. Co.

In line with its established policy of providing up-to-date service, the Western Telephone Corporation, whose general offices are located at Salina, Kansas, recently completed the rebuilding of its Taft, Texas, telephone plant.

The rebuilding operations extended not only to the central office equipment and to the city outside plant, but to a great portion of the rural developmem, with the result that Taft, Texas, as far as telephone equipment is concerned, is new from stem to stern.

In 1923, T. A. Vernor was put in charge of the operation of the telephone system. These exchanges operated under his management for several years.

The Coleman-Fulton Pasture Company, owners of the Taft exchange, found it necessary to build telephone exchanges at several of the smaller towns near Taft, among which were Gregory and Odem.

Mr. Vernor has had considerable experience as a lineman and troublesman in central Texas, and before coming to Taft he had managed several of the smaller exchanges that were owned by the Gonzales Telephone Company of Gonzales, Texas.

In 1926, Mr. Vernor purchased from the Coleman-Fulton Company its exchanges, including Taft and other properties, and operated them until early in 1929. During that year he decided to sell, with the result that the plants were disposed of to H. J. Clark, general manager of the Western Telephone Corporation, which owns and operates the exchanges, always giving to the community telephone service second to none.

Mr. Vernor's record of twenty-two years in the telephone business and not having missed a day in that length of time was sufficient evidence to the new management that they could not select a better man than Mr. Vernor to operate their properties.

Immediately after the purchase of the telephone company by the Western Telephone Corporation, plans were made to rebuild the entire system and the first town selected was Taft.

The central office equipment as well as the subscriber station equipment was purchased from the Stromberg-Carlson Manufacturing Company.

A new building was constructed in which to house the equipment. The initial installation of the central office equipment consists of a three position switchboard, having an ultimate capacty of 900 local lines, the lines being arranged on a three panel basis.

The present installation consists of 300 local lines, 10 toll lines and 30 rural lines. The local lines are arranged on an associated basis and employ the use of Stromberg-Carlson 190 type line and cut-off relays.

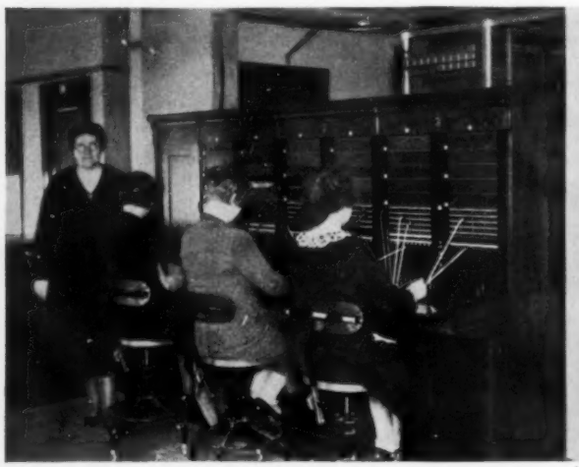
Rural and toll lines are also lamp ended and so arranged that the operator is given a positive indication of the code rings going over any particular line. Each position of the switchboard is equipped with full Universal cord circuits, each cord circuit requiring the use of seven Stromberg-Carlson standard 200 type relays, 13-A repeating coils. condensers, etc.

By referring to the accompanying photographs of the terminal room, one will see the excellent way in which the terminal equipment as well as relay racks are laid out. The equipment is accessible from every point of view and so arranged that no artificial light is needed. The testing equipment is standard Stromberg-Carlson 2-B Test Set complete with all accessories. It is not necessary to employ the use of a separate telephone when using this testing equipment.

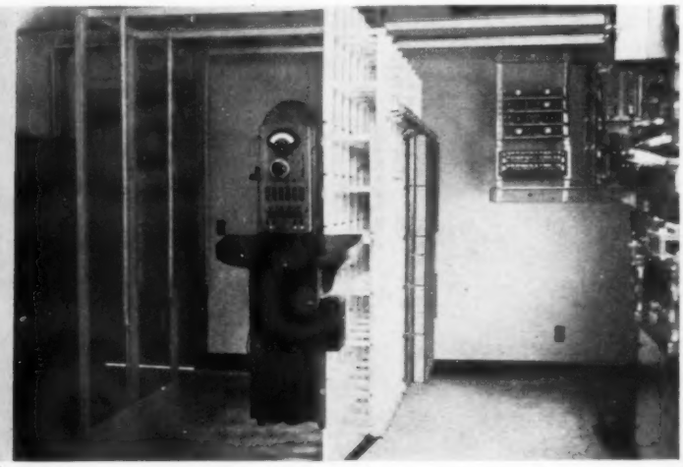
The entire power job is complete in every way, the Stromberg-Carlson power board being of slate and employing the use of standard Crouse Hind switches and Weston No. 271 type meters. The main battery consists of 11 cells of the Electric Storage Battery Company's E. M. G. O. 7 cells. The noise killer battery consists of 10 cells of B. T. M. batteries. Both of these batteries are chloride accumulators sealed and spray-proof type.

There is also included in the power set-up a Sangamo watt hour meter for the purpose of automatically charging the main battery. In connection with this meter there is supplied the necessary visible and audible alarms to notify the power plant man in case of a power or tube failure. Ringing current is derived from Stromberg-Carlson 2-B Converters, these converters being in duplicate.

From the foregoing it will be noted that the entire central office job is complete and of sufficient size in every respect. The same is true of the outside plant. Construction work, as well as materials employed, are of the highest quality, with the result that Taft, Texas, is enjoying excellent telephone service. To quote Mr. Vernor, "The equipment is working out like a charm. If there has ever been a hitch in it in any way it has not come to my attention. In fact, I am satisfied that it is mighty good apparatus."



Stromberg-Carlson switchboard at Taft, Texas.



Relay rack and power equipment at Taft, Texas.

A New Source of Revenue . . .

Here is a new product at a time when there is a real need for additional revenue.

Every P. B. X. subscriber is a prospect.

It is a time-saver and therefore a money-saver in every business and institution.

P. B. X. Service is improved.

Service may be furnished on a rental basis similar to P. B. X. Service.

Installation is simple.

Maintenance is negligible.

This product is the Stromberg-Carlson Paging System. For years, the demand for a means of getting in touch with persons who are not at their usual places has been acute. Bells, buzzers and lights have helped but the complicated codes, the irritating noises, and the short range of lights have limited their effectiveness.

Now Stromberg-Carlson solves the problem with its Paging System which transmits, in natural speaking tones, the name of any individual, or group, with any message or instructions to any part or all parts of the premises simultaneously. The volume is adjusted to meet each location requirement. There is no limitation as to who may be paged . . . visitors or patrons may be called as easily as employees.

The Stromberg-Carlson Paging System works most advantageously in connection with the P. B. X. switchboard.

The P.B.X. operator is the natural person to establish connections between individuals within the organization.

The Paging System assists the P.B.X. operator in locating called parties thus cutting down the holding time on trunk lines.

The installation and maintenance is easily handled by the P.B.X. service man.

These are the reasons why telephone companies find the Stromberg-Carlson Paging System a means of improving P.B.X. service as well as A New Source of Revenue.

Write for complete information.

There is nothing finer than a Stromberg-Carlson

Paging System Markets

Industrial Concerns
Hotels
Hospitals
Schools
Stores
Recreational Centers
Government Institutions
Restaurants
Garages

Stromberg-Carlson Telephone Manufacturing Company

Factory and General Offices:

100 CARLSON ROAD, ROCHESTER, N. Y., U.S.A.

Branch Offices:

CHICAGO, ILLINOIS
LOS ANGELES, CALIFORNIA
KANSAS CITY, MISSOURI
SEATTLE, WASHINGTON
SAN FRANCISCO, CALIFORNIA
TORONTO, CANADA

Southern Representative

SCOVILLE MERCANTILE COMPANY, ATLANTA, GA.

1894 **Stromberg-Carlson** 1932

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN THIRTY-FIVE YEARS

Illinois Holds Annual Convention

"No Exhibits" Made Contrast to Former Meetings. "It Was Indeed a Business Meeting." Was Report of a Number Who Braved Snow Storm to be Present at State Gathering.

At the annual convention of the Illinois Telephone Association held at Peoria November 16th and 17th, the following directors and officers were elected:

Directors:—T. C. Ainsworth, Bloomington; A. R. Bone, Chicago; C. R. Brown, Springfield; Geo. X. Cannon, Freeport; Donaldson Coombs, St. Louis, Mo.; E. D. Glandon, Pittsfield; R. E. Gordon, El Paso; H. A. Joslyn, Sycamore; H. G. Lankford, Chicago; R. A. Lumpkin, Mattoon; R. L. Parker, Geneseo; J. G. Hardy, Springfield; A. R. Patterson, Streator; Louis Pitcher, Dixon; R. G. Roadstrum, Galesburg; J. G. Schwarz, Jerseyville; Earl Stice, Altamont.

Officers:—J. G. Schwarz, president, Jerseyville; A. R. Bone, vice-president, Chicago; A. J. Parsons, secretary-treasurer, Springfield.

The 28th annual convention of the Illinois Telephone Association was interesting in that it was a strictly business meeting from start to finish. Reports of the president and secretary showed the conditions of the industry and the activities of the Illinois association in a very favorable light. Report of the secretary showed extensive traveling during the year, a large number of exchanges visited, six district meetings held and traffic conferences conducted in different sections of the state. The transmission engineer was unusually busy with work pertaining to his department. The publicity department has continued to function, sending out news letters twice each month, advertisements for exchanges were prepared by the Springfield office, and drawings and cuts furnished at cost by the association. The strength of the association was shown to have increased as more members were received than dropped.

An interesting talk by Warren Safford of Troy, Ohio, on "Business Outlook" was closely followed by the audience, as Mr. Safford is known as a clear-thinking business man whose properties have stood out as ideals in Ohio. "I have no fear for the future of America," says Mr. Safford, "and communication is one of the tendrils that supports and helps America climb. So, therefore, let us not lose faith. Confidence rules the world; without it disintegration takes place immediately."

President MacKinnon of the National association spoke on the "National Situation", in which he told of conditions throughout the country and legislation pertaining to the telephone industry; regulation and taxes are always vital questions. Legislative bodies throughout the country are viewing utilities as subjects for reductions in rates, and every telephone company should prepare himself to defend his rates.

"Selling Toll Service," was a subject handled very forcefully by E. R. Cogswell of Chicago, commercial manager of the Illinois Bell Telephone company; this subject should be studied very thoroughly before being presented by salesmen, according to Mr. Cogswell.

"Let's Talk It Over Session" was a very interesting one, and was participated in by many in a round-table discussion of present day problems. Mr. Cannon of Freeport thinks that if we have faith in our country we must have faith in the future of our business. A. R. Patterson of Streator felt the smaller companies had not given the matter of rates and future relations thereto proper consideration and felt the larger companies should help them. E. A. Purcell of Mattoon believes in organizing the employees into a working unit and furnishing them with reasons why telephone service is invaluable to farmers. A. E. Henry of Princeton, advocated follow-up calls for disconnects and believed this would result in reclaiming orders. R. P. Dexter of Galva told of holding some of the farmer subscribers by cancelling some of the older bills and beginning with a clean bill. Others told of taking commodities in exchange for service to farmers in order to hold the business. It was felt that it was better to sacrifice past earnings rather than have the phone disconnected.

Fair attendance was recorded at the traffic conferences, and unusual interest shown by those who felt inclined to avail themselves of the educational values of these sessions.

Resolutions were passed expressing appreciation of the association to officers and directors for the work accomplished the past year.

A dinner and dance furnished the social feature of the meeting.

OUR AMBITION!

among our assets we like to count one that money cannot buy--

YOUR GOOD WILL

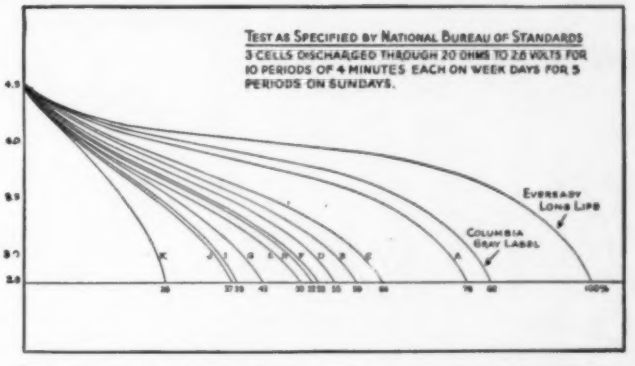
And so at this Holiday Season we extend to you, not as a patron or a possible patron, but as a friend, the Best Wishes for a heart full of Happiness this Christmas time and Prosperity throughout the New Year

TELEPHONE ENGINEER

LOWERED PRICES and ALL-ARMORED CONSTRUCTION

MORE than a quarter of a century of continuous research and development has brought National Carbon Company telephone batteries to the highest state of efficiency ever attained in products of their kind. And controlled sources of raw materials, plus waste-eliminating production, have enabled radical price reductions on Columbia Gray Label and Eveready Long Life Cells.

The longer life of these two acknowledged masters in telephone cells means not only lowest operating cost-per-day, but also reduced labor expense due to less frequent replacements. Their dependability and sustained high transmission efficiency help to prevent service interruptions and customer complaints.


TEST AS SPECIFIED BY NATIONAL BUREAU OF STANDARDS
3 CELLS DISCHARGED THROUGH 20 OHMS TO 2.8 VOLTS FOR 10 PERIODS OF 4 MINUTES EACH ON WEEK DAYS FOR 5 PERIODS ON SUNDAYS.
EVEREADY LONG LIFE
COLUMBIA GRAY LABEL

Day's life on Standard Intermittent Test is expressed in percentages based on Eveready Long Life as 100%. The Columbia Gray Label shows 82% service, but also carries a lower price.

Note the all-armored construction: New metal-seal top (patented) — insulated against energy loss; sealed against moisture and electrolyte leakage. No wax or pitch seal to break in shipment. Made by America's largest and best-equipped dry battery manufacturer; and inspected, tested and continually improved by the largest battery laboratory in the entire world! Ask your distributor for the new price schedule on these economical, all-armored construction, super-service telephone batteries.

Columbia
AND
EVEREADY
Dry Batteries

NATIONAL CARBON COMPANY, INC.
General Offices: New York, N. Y.
Branches: Chicago New York San Francisco
Unit of Union Carbide UCC *and Carbon Corporation*

News From the Field

The Illinois Bell Telephone company November 23rd, declared the regular quarterly dividend of $2 a share on the capital stock.

The boards of directors of the Bell Telephone Company of Pennsylvania and the Diamod State (Delaware) Telephone Company declared the quarterly dividends of $1.62½ per share on the outstanding 6½ per cent cumulative preferred stocks of both companies, payable January 14 to stockholders of record December 20.

At the beginning of 1932, approximately 150,000 investors owned about $234,000,000 par value of stock in the Associated Operating Companies of the Bell System. About 118,000 of these investors held preferred stock, while some 32,000 held common stock. Some of these stockholders owned shares in more than one company and some owned American Telephone and Telegraph Company stock.

The Illinois Bell Telephone Company, November 30, paid $405,708 into Chicago's corporate fund, as compensation due for the three months ending with September. At the same time the city paid the telephone company $46,323 for telephone service. Payments were made under the phone ordinance of last year.

Construction work was started recently involving the relocation of portions of the Darlington-Platteville Long Distance line between Belmont and Platteville, Manager Eugene Schultheis, Wisconsin Telephone Company, announced. The relocation work is required because of the widening of U. S. Highway No. 118, near these points. An expenditure in excess of $10,000.00 is involved.

The Western Telephone corporation in Denison, Iowa, has begun a movement whereby the rural community is kept in touch with the daily local market quotations. Every morning at 10 o'clock line calls are put through to the rural patrons of the company informing them of the latest quoted prices of various farm products.

A new switchboard and police signal system has been placed in operation at Atlanta, Ga., at a cost of $20.000. A hundred new signal boxes, with the European style telephone permitting policemen to hold the receiver and transmitter in one hand, have been installed along with new cables and other fittings. A new device permits the patrolman to shut out noises which would prevent him hearing the instructions of the switchboard operator.

Several projects requiring expenditures in excess of $50,000 are in progress or will start soon in the Milwaukee exchange area of the Wisconsin Telephone company, President William R. McGovern announced. The largest item involves placing of "loading" coils on underground telephone cable circuits connecting some of the present telephone central offices in the Milwaukee exchange with the new Hilltop office.

Installation of equipment making 100 additional lines was reported completed by the Northwestern Bell Telephone company exchange at Waverly, Iowa.

An announcement was made at Biscon, South Dakota, that a reduction of $8 a year has been made in the rate charged subscribers on the Lodgepole-Hettinger telephone line, operated by the Lodgepole-Hettinger Telephone company. The old rate was $18 a year for each subscriber. Accordingly, the new rate will be $10 a year, and is to be paid by January 1 of each year.

The U. S. Federal Court annuls order for lower phone rates, and a utility body is enjoined from putting rates into effect. By a three judge Federal court decision the. Indiana Public Utilities Commission has been permanently enjoined from enforcing their order lowering rates to subscribers of the Southern Indiana Telephone and Telegraph Company in Loogootee, Shoals and several other Southern Indiana towns.

The public service commission of Wisconsin issued an order for a 12½ per cent reduction of the Wisconsin Telephone Company's rates throughout the state. The company took the case to the federal courts, and two district judges granted an interlocutory injunction against the enforcement of the reduction. The state has appealed the decision to the supreme court of the United States. There is no telling how long the matter will be tied up. In the meanwhile, the telephone users in Milwaukee and other parts of the state will pay the higher rate.

Climaxing a two-month sales campaign, employes of the Sac City telephone sales division of the Central West Public Service held a two-day business session in the Warrior Hotel at Sac City, Iowa.

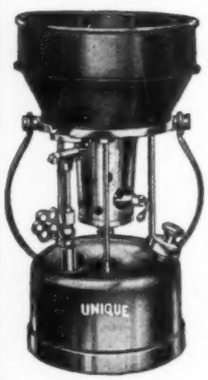
Sixty members of the division, which includes towns in Iowa, South Dakota, Minnesota and Illinois, attended the meeting, conducted by E. B. Samp, of Sac City, division manager of the company.

PHONE VALUATION STUDY NEARS END IN OKLAHOMA

Summary of appraisals of the Southwestern Bell Telephone Company long distance toll properties in the state is expected to show a material reduction under the company's valuation, B. Richardson, engineer for the corporation commission, said.

Richardson said the appraisal of the property had been completed, and the valuations were being compiled in 44 sections to show the value of toll properties in Oklahoma.

The appraisal did not include exchange properties, or the local telephone properties in the state. The hearing will be on toll property.



TEN MINUTES

to melt 50 pounds of solder! Couple this feature to the strength and simple design of all UNIQUES — and you have the reason it's preferred in the telephone field. We'll send it on trial. Write—

UNIQUE
Manufacturing Co.
225 Whiting St.
Chicago, Illinois

A. B. ELIAS HEADS TELEPHONE PIONEERS

A. B. Elias, for many years president of the Southwestern Bell Telephone Co., St. Louis, Mo., was elected president of the Telephone Pioneers of America at the last annual meeting.

Other officers elected at the same time, were:

W. B. T. Belt, president, Northwestern Bell Telephone Company, senior vice-president. Other vice-presidents elected were C. G. Stoll, vice-president, Western Electric Company; Lloyd B. Wilson, president, Chesapeake and Potomac Telephone Company; J. S. Wiley, vice-president and general auditor, New York Telephone Company; H. P. Charlesworth, vice-president, Bell Telephone Laboratories, and Elsa L. Betz, supervising clerk, traffic department, Bell Telephone Company of Pennsylvania.

The members of the executive committee elected to serve during 1933 and 1934, are E. F. Carter, vice-president, American Telephone and Telegraph Company; F. E. Congdon, general plant manager, New Jersey Bell Telephone Company, and T. J. Feeney, assistant to president, New England Telephone and Telegraph Company.

The meeting was the nineteenth annual convention of the Pioneers, and the eleventh of the General Assembly. About 120 delegates attended.

F. E. SHOUP MADE ASSISTANT TO MANAGER IN TEXAS

F. E. Shoup, advertising manager of the Southwestern Bell Telephone Company in Texas, with headquarters at Dallas, since 1921, was recently appointed assistant to the manager of the Texas properties of that organization. This is a deserving promotion for a deserving employee.

Mr. Shoup has been with the telephone company for some twenty-five years, graduating from the newspaper fraternity into a full-fledged professor and taught some time before entering the telephone field. He is well known thruout Texas and has hosts of friends who congratulate him upon his promotion.

DEMAND $2,000 DAMAGES OF TELEPHONE COMPANY

David and Sarah R. Decker, 222 East Gilbert street, Muncie, Ind., instituted suit against the Indiana Bell Telephone Company in the Circuit Court, asking judgment for $2,000. The basement and walls of the Decker home were damaged, the complaint charges, by water from a bursted main in a nearby garage occupied by the defendent telephone company. The break in the pipes occurred July 20.

We can supply you with almost any book on Telephone Subjects

ASK FOR QUOTATIONS

Telephone Engineer 185 N. WABASH CHICAGO

W. L. Runzel, President, brings to this organization 41 years' experience in the manufacture of this type of telephone equipment

Telephone and Switchboard Cords and Wire

May we quote you on your requirements?

RUNZEL CORD AND WIRE CO.

4727-31 Montrose Ave., Chicago

The Home of the Perfect Cord

Buy

this book for your **Employes**

PUBLIC UTILITIES AND THE PEOPLE

By **Henry M. Robinson**

For the first time a comprehensive, easily understood textbook on the fundamentals of the public utility industry is now available for your employes.

Public utilities are front page news items. They are being assailed in the Halls of Congress, in Committees, and by politicians.

The more true fundamentals of the business your employes know, the better able they will be to combat erroneous ideas in the public mind.

Let each of your employes become a member of your public relations department by reading this book.

Already used and recommended by a number of Bell and Independent companies.

PRICES: Paper binding.....$ .90
Cloth binding..... 1.50

Special Rates on Quantities

Place your orders directly with

TELEPHONE ENGINEER

185 N. WABASH AVE. CHICAGO, ILL.

Help your operators **cut toll losses**

In spite of the world-wide reputation of the Calculagraph, there is still an occasional telephone manager who appears not to appreciate in full the importance of this instrument as a safeguard against toll charge losses.

He is apt in all good conscience to place the blame on his toll-board operators—which is hardly fair, when the Calculagraph is so easily available. Operators with nothing but a time-of-day indicator and a pencil cannot be expected to provide 100% accuracy in their busy work. But you can demand 100% accuracy from the Calculagraph *at all times*—and get it!

With utmost precision, the Calculagraph mechanically computes and prints ELAPSED TIME. A pull of the handle clearly and indelibly stamps *on the toll ticket* the time of day of each call, also the actual ELAPSED TIME the circuit is in use, for any number of calls. No arithmetic by pencil—no diversion from other duties—no chance of error—the Calculagraph is easily and quickly operated while conversing with either the calling or answering party. The Calculagraph is now supplied in either the well-known spring-driven model or an electric-driven model operated by electric impulses from a master clock (24 or 48 volts), or by self-starting synchronous motor (60-cycle A. C.). Prices and detailed information on request.

THE CALCULAGRAPH COMPANY

50 Church St. Dept. 22 New York City

CALCULAGRAPH

THE ELAPSED TIME RECORDER

Identify your inquiry to advertisers by saying—"As shown in TELEPHONE ENGINEER"

With Manufacturers and Jobbers

ANNOUNCE CHANGES IN KEARNEY ORGANIZATION

The James R. Kearney Corporation of St. Louis, Missouri, announces its association with J. B. Clapp, who will have the title of district representative in the territory consisting of the eastern half of the state of Pennsylvania, all of New Jersey, Delaware, District of Columbia, Maryland and a portion of the state of West Virginia.

Jerry Clapp is particularly well known in this territory by reason of his past connections with the Public Service Electric & Gas Company of New Jersey, the International Telephone and Telegraph Corporation and more recently the Copperweld Steel Company.

They also announce a change in territory whereby Warren M. Heim, who formerly represented them in New York state proper, is transferred to New York City with offices at No. 30 Church Street.

Mr. Heim is particularly well known in the east because of other connections with such companies as the Oliver Iron and Steel and Hubbard and Company. He succeeds T. B. Dally and his associate, L. M. Meckler, who are no longer connected with the James R. Kearney Corporation.

M. T. Tipsord, a special representative of the James R. Kearney Corporation, has just recently completed a tour of the eastern states with the Kearney Display Truck.

The latest developments in the Kearney line are carried on the display truck on which their actual operation may be demonstrated.

Live line maintenance work can also be demonstrated since the truck carries a full complement of Kearney Live Line Tools.

NEW KELLOGG BOARD FOR VIRGIN ISLANDS

The St. Croix Municipal Telephone Company of Christiansted, Virgin Islands, recently purchased a Kellogg 150 line magneto switchboard from the Kellogg Company of Chicago.

The Virgin Islands, which were purchased by the United States Government from Denmark for use as a naval base, now have all their exchanges equipped with Kellogg switchboards. The new board is completely weatherproofed because of climatic conditions in the islands. The entire inside of the cabinet is shellaced, coils are impregnated with special moisture-proof compounds, bakelite spool heads are used in the relays, and every other part of the switchboard that would possibly be affected by the hot, moisture laden air of the tropics is well protected. The other Kellogg equipment used in the Virgin Islands has withstood the climate exceptionally well and has given good service constantly. The new Kellogg switchboard is to be installed sometime next month according to Mr. W. N. Denny, Head of Finance of St. Croix.

OTTO BERNZ CO. MOVES PLANT TO ROCHESTER, N. Y.

Otto Bernz Company, Inc., manufacturers of furnaces, torches and plumber tools, formerly located in Newark, N. J., recently moved its entire office and plant to 280 Lyell Avenue, Rochester, N. Y.

Contrary to reports, the company announces that it will not dispose of its regular plumber tool line.

Officers of the company are president, L. O. Graves; treasurer, A. Lapine; secretary, Joseph Wollman.

The company maintains branches and representatives in New York City, Denver, Forth Worth, Helena, San Francisco, Los Angeles, Seattle and St. Thomas, Ontario, Canada.

Electrical Measuring Instruments . . .

They are the Telephone Man's most important tools. Like all tools, they suffer from wear and tear and accidental overloads.

Very seldom can these instruments be spared for more than a few days for periodical adjustment or repairs. For more than 17 years, we have specialized in repairing and testing all types and makes of electrical instruments.

We can assure the Telephone men of a prompt and economical service on all their instruments and other testing equipment.

Try us on your next job.

Illinois Testing Laboratories, Inc.

Authorized Midwest Service Station for Many Instrument Manufacturers

147 W. AUSTIN AVE. CHICAGO, ILL.

Telephones: Superior 5264-5265

THE FUTURE

The telephone industry, in common with other industries of the world, has faced a depression of greater magnitude than that of any other generation.

It is an interesting fact, however, that adversity compels thinking and that thoughts crystalize into concrete form. As a result of our present adversity, great technical advances will be apparent in many industries of which telephony will not be the least.

The Independent telephone industry is entering upon a new era and the rewards of those prepared will be greater than in the past.

Obsolescence will retire quantities of equipment now out of service due to take outs. New standards of recently engineered and priced apparatus will not permit this old style equipment to be again placed in service.

The Leich Electric Co., has been engaged for two years in the development of telephone equipment which will meet these new standards.

The trade journals will announce soon this new line which is part of a larger developmental program of the Leich Electric Co., Genoa, Illinois. Watch for the announcement.

VISBLEX—A VISIBLE RECORD CONTROL

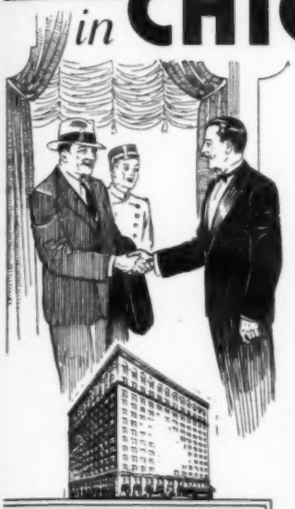
Today in business there is demanded much of records—they must be accurate—they must be quickly available—they must be maintained economically.

The Henry Conolly Company, 39-43 Clarissa St., Rochester, N. Y., manufactures and distributes Visblex, which is a visible record control in book form. Visblex has been adopted by many nationally operated organizations as the fastest and most economical record keeping equipment.

Visblex is adaptable to most any type of record application, and the Henry Conolly Company will be pleased to counsel with any organization on their record keeping problems. This service will not incur any obligation.

POSITION WANTED: Experienced telephone man would like to hear of available position as local manager or wire chief. Has had 11 years experience, is married, can furnish bond and good reference. Write AG c/o TELEPHONE ENGINEER.

The Homelike Atmosphere in **CHICAGO'S LOOP**



There's a warmth, a friendly regard for your comfort at Hotel Lorraine that is often lacking in larger hotels. The special food and low prices in our Coffee Shop and Cafeteria will appeal to you. Garage at moderate rates.

ONE PERSON WITH BATH
$1.50 and $2.
TWO PERSONS WITH BATH
$2.50 and $3.

HOTEL LORRAINE
WABASH AT VAN BUREN

In ST. LOUIS

The AMERICAN HOTEL
275 ROOMS WITH BATH
$2.00 up

The ANNEX
226 ROOMS WITH BATH
$1.50 Up

The AMERICAN HOTEL
MARKET AT SEVENTH

The AMERICAN ANNEX
MARKET AT SIXTH

Our Food has made our Reputation
COFFEE SHOP OPEN UNTIL MIDNIGHT

New Baby Giant Gas Projector

Protect Your Men While Making Collections and Transporting Cash to Bank

Powerful---Safe---Handy---Inconspicuous

THIS IS JUST THE THING FOR YOUR ROUTE MEN
CAN BE USED AS A "BILLY" AFTER DISCHARGE

Specifications

Gauge 20 (17 mm.) Weight 6 ounces, length 6¾ inches, range 10 to 12 feet, spread of gas, four-foot circle at 10-foot range. SAFETY—Easily operated safety device that positively guards against accidental discharge. Handy to carry in pocket or automobile. Convenient for desk drawer or cashier's cage. Projects a very powerful TEAR GAS which blinds and chokes the victim into complete submission and renders his capture easy and safe.

DOES NO PERMANENT INJURY
THE MOST POWERFUL POCKET SIZE GAS WEAPON IN EXISTENCE

Price and further description upon request.

Chemical Warfare Products Co.

Suite 1218, 63 East Lake Street Chicago, Ill.

Book Review

"PUBLIC UTILITIES AND THE PEOPLE," by Henry M. Robinson. 142 pages, paper cover.

Since material progress and economic welfare of the people has been closely related to the public utilities problem this book serves as a brief informative source and contribution to the laymen of the industry.

From a general survey and abstract of contents of this book, we find the salient feature of the subject considered as organized necessities which from their natural characteristics are most suitable for business monopolies. The author draws this conclusion from the fact that through common use of services and lack of competition, greater benefits accrue to the public, because there is greater opportunity for lower operating costs compared to services rendered on a competitive basis. The author further points out that a public utility must place its services open to the public daily without discrimination to patrons.

In the early history of this industry competition meant high and unjust rates, wasteful adminisration and operating costs so that governmental regulations eventually became inevitable and expedient so as to preserve the interests of the public. Today our utilities are regulated by governmental commissions or bodies of men whose duties involve consideration of equitable adjustments of rates so as to assure the investors of reasonable opportunity for a fair return on their investments, likewise to protect the interests of the public. These matters are far reaching, sustaining the phases of organization, financing and the operation of such industries.

The phase of promotion and legal obligations are discussed at some length, because of its basic importance in establishing such companies to meet the public's needs. Consideration is given to the logical men chosen for such work, sources of capital funds, the forms of securities and their sale.

Another important topic discussed is that of franchises, their issuance depending upon the integrity of the promoter and the nature of the project attempted. Franchises, the author states, are privileges conferred by the government and vested in individuals.

Finally, the book discusses the problem of determining what constitutes a fair rate of return upon capital invested, which is subject to revision by the State Commission according to the change in earnings at different periods of time. All such factors as maintenance, depreciation and obsolescence are also considered in topic form.

The author, a Mechanical Engineer shows his familiarity with the subject and is experienced in this field of work. —Stanley Ed. Williams, Research Engineer, Chicago.

J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies
Rm. 2626 Bankers Bldg., Chicago

RECONSTRUCTED EQUIPMENT

Kellogg Unbreakable type desk set with Chicago 4-bar 1600 ohm inside connection signal set @	$ 8.75
Kellogg No. 2696 type 4-bar 1000 or 1600 ohm Bdg. compacts @ $8.00—5-bar	9.00
Dean Elec. No. 240 4-bar 1000 or 1600 ohm Bdg. compacts @ $6.25—5-bar @	7.75
Western Elec. No. 20 desk set with No. 315 3-bar 1000-1600 or 2500 ohm inside connection signal set @	10.00
Western Elec. No. 22 3-bar Bdg. hand Gen. with cranks and screws @	1.50
Chicago Tel. Supply 4-bar Bdg. hand Gen. with crank and screws @	1.75
Chicago, Century, Eureka & Long Dist. 5-bar Gen. with crank and screws	2.00
Stromberg Carlson 1600 ohm self contained ringers with gongs @	1.50
Kellogg No. 97 C. B. desk sets with No. 75 Straight line steel Bell box @	7.00
Western Elec. No. 293 C. B. Straight line black finish wood hotel sets @	5.75
Western Elec. No. 294 C. B. Straight line short backboard type walnut finish wall sets complete @	3.75
Dean Elec. Straight line C. B. wood hotel sets with Straight line or 16-33-50 or 66 cycle Harmonic ringers @	4.25
Kellogg 16-33-50 or 66 cycle harmonic ringers with gongs @	1.00
Leich Elec. 30-42-54 or 66 cycle Pul or A. C. Harmonic ringers with gongs @	1.00
New Rec. Shells for any Make Receiver @	.37
Mouthpieces @ 7c; Ear Caps @	.15
Monarch Local Battery Ind. Coils	35c ea.
Kellogg No. 51a C. B. @	.40

Write for Bulletins
REBUILT ELECTRIC EQUIPMENT CO.
1940 W. 21st St., Pilsen Station, Chicago, Ill.

When an Audit is not wanted or even courted, there is the place where an audit should be made.

A good audit is an asset to the company in that it has a tendency to breed confidence and to stimulate conscientious work. A good audit is valuable information—is worth more than it costs.

A good auditor is a good adviser.

Don't get along without an audit.

Ask about our Monthly Plan which tells the story at a low cost.

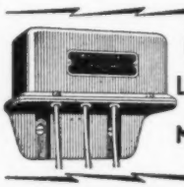
Bowdle
Accounting System
F. A. BOWDLE, Registered Accountant,
Suite 1218, 185 No. Wabash Ave.
CHICAGO, ILLINOIS

FOR SALE
Manually operated Addressograph and Graphotype. First class condition. Also 450 plates.
ONTARIO TELEPHONE CO., INC.
Phelps, N. Y.

We will sell your
Telephone Directory ADVERTISING
or will publish your directory complete
L. M. BERRY & CO. DAYTON OHIO

COFFEY SYSTEM & AUDIT CO.
Exclusive telephone accounting since 1907.
Certified Public Accountants.
We install the well-known
COFFEY SYSTEM
Audits—Rate Cases and Special Work.
A Central Accounting Department.
454 Consolidated Bldg., Indianapolis, Ind.

ACCOUNTING
HERDRICH AND BOGGS
Certified Public Accountants
Specializing in Telephone Accounting and Rate Cases Since 1918.
901-7 Continental Bank Bldg.
Indianapolis, Indiana


CHAPMAN
LIGHTNING ARRESTERS
MADE BY
MINNESOTA ELECTRIC CO
MINNEAPOLIS, MINN.

RECEIVERS

Kellogg F-41-A with bakelite shell and cap	$1.00
Kellogg F-41-A with composition shell and cap	.90

TRANSMITTERS

Kellogg 22-C or L or LC	$1.20
Kellogg 64-C or L or LC	1.00

Entirely rebuilt and refinished.
Fully guaranteed.

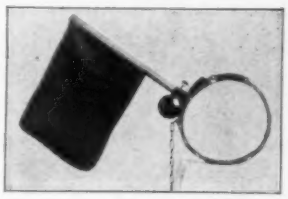
Buckeye Telephone & Supply Company
COLUMBUS, OHIO

Telephone Engineer

COFFING HOISTS

"THE UNIVERSAL TOOLS"

are being used by Telephone and Power and Light Companies in construction and maintenance work, changing insulators on tower lines, for pulling guys, messengers, underground cables, laying water and gas mains, or wherever a lift or pull is needed. Can be used in any position. Sizes from 3/4 to 6 ton, wt. from 14 to 65 lbs. Model A 3/4 ton. Model F 1 1/2 ton.



Flag, flag holders, and electric light for poles, pipes, etc., in transit day or night. Can be easily attached or removed. Spring attached to chain so holder will not work loose.

COFFING HOIST CO.
313 East Vanburen St. DANVILLE, ILLINOIS

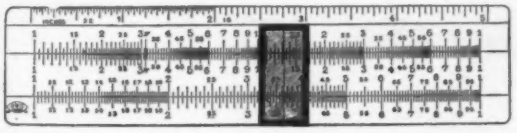
SANDS ELECTRIC CO.

QUALITY
TERMINALS
and
PROTECTORS
AT
LOW COST

No. 50 Unprotected Terminal
Made in 11-16 and 26 Pair

SANDS ELECTRIC CO.
North Chicago, Ill.

Reach for a "Slipstick" Instead of a Pencil
A REAL VEST POCKET SLIDE RULE



White Celluloid — *5½" Long 1/8" Thick* — *Black Numerals*

ENGINEERS, ARCHITECTS, ESTIMATORS
Carry this handy, accurate, easily read slide rule with you — solve your problems in inductance, resistance and capacity — stresses and strains — volume and production costs on the job.

ANYONE CAN LEARN in a few minutes. Each rule with a genuine leather case and a Book of Directions.

$2.50 Postpaid or $2.62 C. O. D.

H. S. DURLAND
63 HINSDALE PLA. NEWARK, N. J.

IT IS TO YOUR BENEFIT TO PURCHASE THIS GENUINE NO. 6 TELEPHONE DRY CELL

Reasons

Price—So You Will Save.

Long Life Performance.

First and High Quality.

A Recognized Cell and endorsed by a man associated as owner and operator of many telephone properties for 35 years.

Made for us by a world-leading battery manufacturer and definitely guaranteed.

PRICE
$19.50 per 100 Cells
F.O.B. Indianapolis—Lots of 25

WE SOLICIT YOUR VALUED ORDERS

INLAND EQUIPMENT CO.
MAX F. HOSEA, Pres.
INDIANAPOLIS, IND.

IS BUSINESS FLAT ON ITS BACK?

"No!" say many exchange managers

Many exchange managers have been successful in selling Teletypewriter Service during this period of depression. Instead of being deterred by conditions, they have taken advantage of them to impress vigorously on prospects the need for a more efficient and economical means of communication.

Teletypewriter Service is not hard to sell even in times like these because you can *prove* that it pays for itself many times over by eliminating messengers, reducing errors, and making possible a much faster service to customers. Manufacturers whose plants or warehouses are located at a distance from their offices are good prospects for Teletype. So are banks, hotels, public utility companies, department stores, publishers, police and fire departments, wholesalers, hospitals and other institutions.

Teletype is not limited in application to large organizations alone. Although some installations include one hundred or more machines, others consist of only two or three. Nor is the field for Teletype confined to large communities. Today many profitable installations are found in relatively small towns and cities.

TELETYPE

SUBSIDIARY OF

Western Electric Company

The makers of Teletype are ready to be of aid to managers of exchanges in developing Teletypewriter Service installations. Descriptive literature is yours for the asking, and on request the company's sales engineers will gladly co-operate with you. Prove to your own satisfaction that business is far from being flat on its back by making a determined effort to sell Teletypewriter Service this winter. The results may greatly surprise you.

For further information, address the Teletype Corporation, 1400 Wrightwood Ave., Chicago, U. S. A.

INDEX TO ADVERTISERS

A

American and Annex Hotels 37
American Electric Co. 27
American Tel. & Tel. Co. 4-5
Automatic Electric Co. ..... —
Automatic Electric Sales, Ltd. ..... —

B

Bernz Co., Otto ..... —
Berry, L. M. 38
Block, Lynton T., Co. ..... —
Bowdle Accounting Systems 38
Buckeye Telephone Supply Co. 38

C

Calculagraph Co. 35
Chemical Warfare Products Co. 37
Coffey System & Audit Co. 38
Coffing Hoist Co. 1
Cook Electric Co. 29
Cope, T. J., Inc. ..... —
Curtin-Howe Corp. ..... —

D

Durland, H. S. 1

E

Electric Storage Battery Co. ..... —

F

Forged Steel Products Co. ..... —
Four Wheel Drive Co. ..... —
French Battery Co. ..... —

G

General Dry Batteries ..... —
Gould, George V. ..... —
Graybar Electric Co. 29

H

Herdrich & Boggs 38
Holtzer-Cabot Electric Co. ..... —

I

Illinois Testing Laboratories 36
Indiana Steel & Wire Co. 29
Inland Equipment Co. 1

K

Kearney Corp., Jas. R. ..... —
Kellogg Switchboard & Supply Co. 6-7
Kester Soldier Co. ..... —

L

Leich Electric Co. 10
Lenz Electric Mfg. Co. .....
Littelfuse Laboratories .....
Lorraine Hotel 37

M

Majestic Hotel ..... —
Minerallac Electric Co. ..... —
Minnesota Electric Co. 38
Morrison Hotel 37

N

National Carbon Co. 33
National Lbr. & Creo. Co. ..... —
North Electric Co. 40

P

Partridge, T. M., Co. ..... —
Phillips, Eugene F. ..... —
Pickwick Arms Hotel ..... —
Premier Electric Co. ..... —

R

Rebuilt Electric Equip. Co. 38
Reliable Electric Co. 10
Runzel Cord & Wire Co. 35

S

Sands Electric Co. 1
Southern Wood Pres. Co. ..... —
Stewart Bros. ..... —
Stromberg-Carlson Tel. Mfg. Co. 8-9-31
Suttle Equipment Co. ..... —

T

Teletype Corp. 2
Telkor, Inc. ..... —
Texas Creosoting Co. ..... —

U

Unique Mfg. Co. 34
Universal Specialty Co. ..... —

W

Welker, J. H. ..... —
Western Electric Co. ..... —
Whitney Blake Co. ..... —
Wray, J. G., & Co. 38

TELEPHONE ENGINEER, December, 1932. Volume 36, No. 12. Published monthly by TELEPHONE ENGINEER. Publication office, Morton, Ill.: Editorial office, 185 N. Wabash Ave., Chicago, Ill. Subscription price, $2 a year in the U. S. Entered as second-class matter, at the Post Office at Morton, Illinois, under act of March 3, 1879.

Friendly, human advertising for HOME TOLL CALLS

OFTEN families and friends scatter with the years. In separation, they miss each other. And familiar voices from far away are welcome, reassuring.

Planned from that angle, residential toll advertising runs regularly in women's magazines. It dramatizes the happy warmth of human voices heard across the miles. Two representative advertisements are shown on the opposite page.

The advertisement at the left appeared in November, when children at school and mothers at home were beginning to wonder if Christmas vacation would *ever* come! . . . The other advertisement is in the December magazines, with holidays just ahead and thoughts turning naturally to the folks back home. . . . Both advertisements list sample rates to prove that telephone reunions are inexpensive.

Carefully conceived, carefully timed advertising of this type should help to stimulate residence toll traffic for all companies, everywhere.

"Thanks for the box, mother. I was wishing you'd call"

YOUR BOY may be a hundred or a thousand miles away at school, but he's only a few minutes away by telephone! Voice-visit with him often. Talking is next best to seeing, and a sure cure for loneliness — yours and his. It's *inexpensive* too.

The day station-to-station rate for such calls is about

25c *for* 25 *miles*
40c *for* 45 *miles*
50c *for* 75 *miles*
75c *for* 125 *miles*

Many evening and night rates are lower. Where the charge is 50 cents or more, federal tax applies.

THE FOLKS BACK HOME WOULD LIKE TO HEAR YOUR VOICE

THE folks back home see you all too seldom. They'd have many things to tell you, eager questions to ask, if you could drop in today. Why don't you — *by telephone?* It will carry your voice as quickly and clearly across the state as across the street. It will bring you intimate, personal bits of news, as if you were face to face.

Once you've tried a family reunion by telephone, you'll want to continue—on regular days at regular hours. It is easy to do and the cost is quite small.

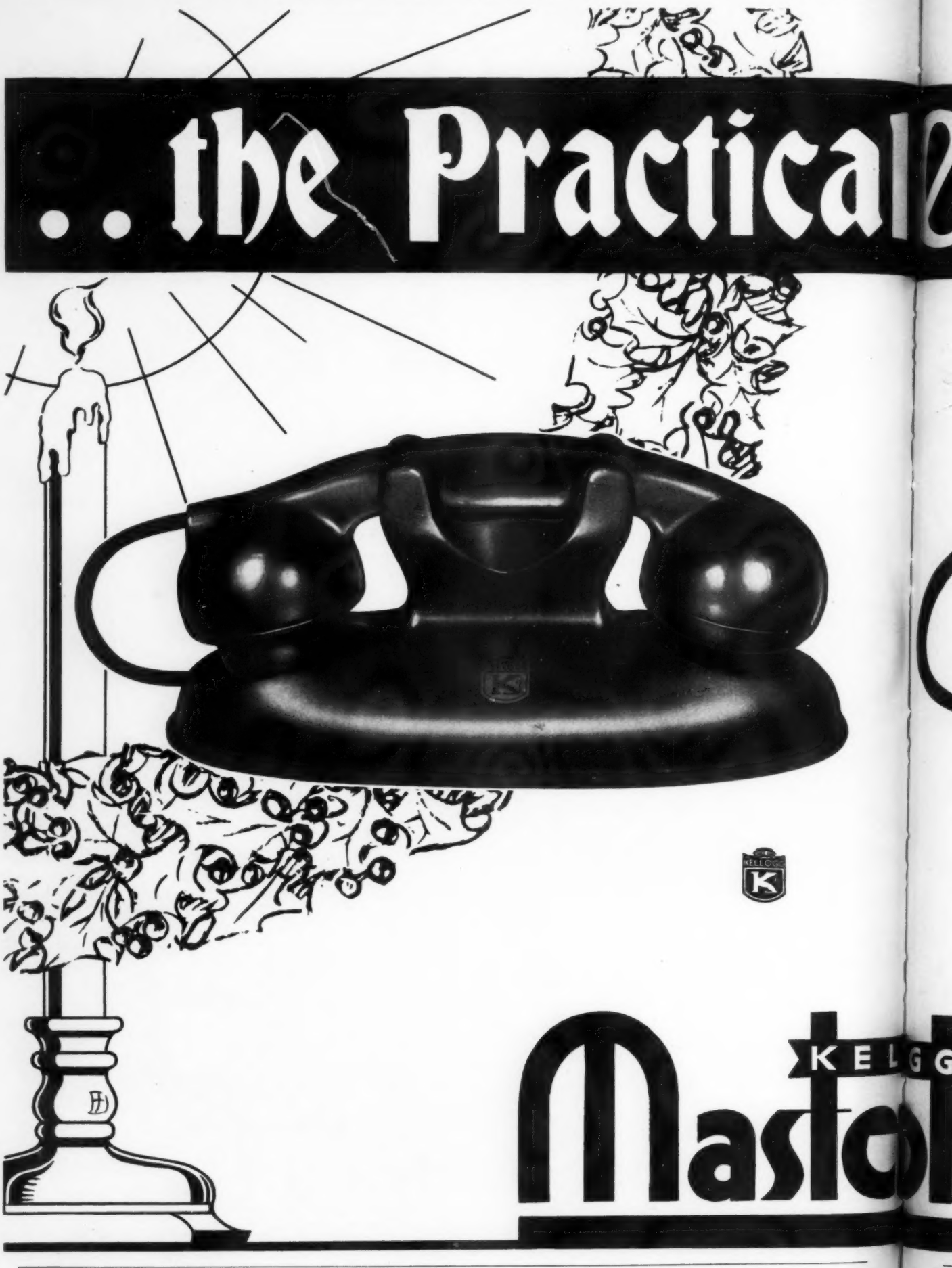
The day station-to-station rate for such calls is about

25c *for* 25 *miles*
40c *for* 45 *miles*
50c *for* 75 *miles*
75c *for* 125 *miles*

Many evening and night rates are lower. When the charge is 50 cents or more, federal tax applies.

An *Advertisement of the* American Telephone *and* Telegraph Company

Identify your inquiry to advertisers by saying—"As shown in TELEPHONE ENGINEER"

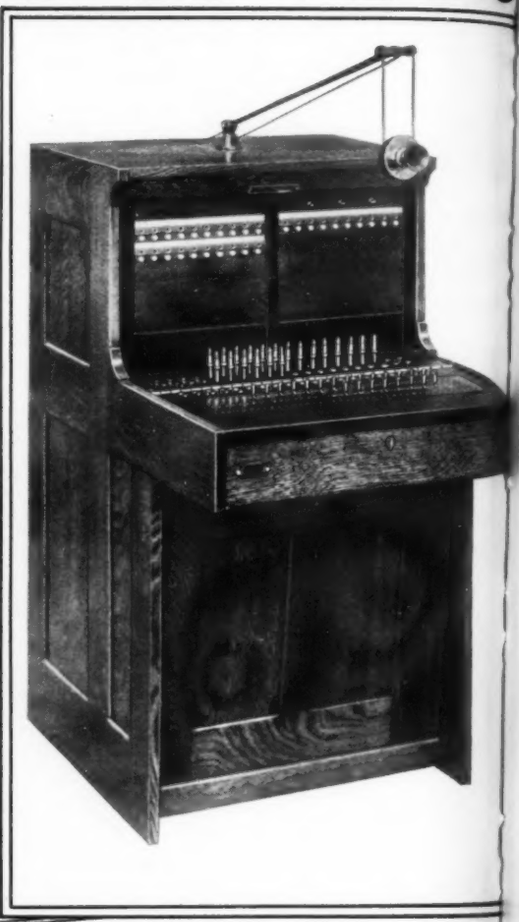

..the Practical
KELLOGG
Mastoi

alChristmas Gift

KELLOGG

tohonE

P. B. X.—Service



There is nothing finer than a Stromberg-Carlson

1894

Stromberg

MAKERS OF VOICE TRANSMISSION AND VOICE

...ice that is complete.

Complete P.B.X. Service can be furnished only when it is supervised by a competent operator because it includes:

1: *The prompt completion of connections.* The busy executive cannot afford to use his own time to look up telephone numbers, secure connections and wait for the called party to answer.

This is an operator service.

2: *The efficient handling of long distance connections.* Long distance connections usually require several minutes for their completion and frequently considerable time is consumed in locating the called party. Someone must follow the call through and take the reports.

This is an operator service.

3: *Receiving visitors.* The courteous reception of visitors is an asset to any business or institution. The P.B.X. operator is the logical person to perform this duty. She is refined and intelligent and is in a position to get the visitors in touch with the parties who best can take care of their needs.

This is an operator service.

4: *Operation of the voice paging system.* The necessity for paging usually originates at the P.B.X. switchboard because the called party cannot be reached at his telephone. With the microphone at the switchboard there is no delay in locating the party.

This is an operator service.

5: *Quick handling of emergencies.* When emergencies arise which require police, fire department, or ambulance, the operator knows how to get the call through with the least possible loss of time.

This is an operator service.

A Stromberg-Carlson P.B.X. Switchboard attended by a competent operator furnishes complete service—and more. It possesses operating and maintenance economies.

Stromberg-Carlson P.B.X. Switchboards are wired for use with any type of central office equipment.

Stromberg-Carlson P.B.X. Switchboard parts are interchangeable. A small stock will take care of extensions and repairs on all switchboards.

Stromberg-Carlson P.B.X. Switchboards are equipped with removable trunk circuit plates. Extensions and servicing can be taken care of without interruptions to service because all work is done outside of the switchboard. It takes only a few minutes to remove the old plate and insert the new one.

Ask Stromberg-Carlson engineers to send you complete details regarding Stromberg-Carlson P.B.X. Switchboards.

Write for Bulletin 116.

Stromberg-Carlson Telephone Manufacturing Company

Factory and General Offices:
100 CARLSON ROAD, ROCHESTER, N. Y., U. S. A.

Branch Offices:
CHICAGO, KANSAS CITY, SAN FRANCISCO, LOS ANGELES, SEATTLE, TORONTO

Southern Representative
Scoville Mercantile Company, Atlanta, Ga.

Carlson

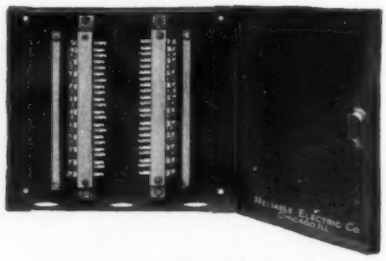
...CEPTION APPARATUS FOR MORE THAN THIRTY-FIVE YEARS

OUTSIDE or INSIDE

Type "RU" Pole Terminal

Cable Terminals

"Reliable" offers high-grade telephone equipment to meet the demand of all construction conditions.



Type "E" Building Terminal

Write for samples and test for low installation cost, low maintenance and maximum efficiency

Specify "RELIABLE"

Reliable Electric Company

3145 CARROLL AVE. CHICAGO, ILLINOIS

LEICH EQUIPMENT

SWITCHBOARDS
Common Battery
Magneto
P B X

TELEPHONES
Common Battery
Magneto
Mine

RINGING CONVERTERS
Harmonic Frequencies
Single Frequency

Telephone and Switchboard Parts

Transmitters
Receivers
Induction Coils
Generators
Hookswitches

Ringers
Drops
Jacks
Keys
Repeating Coils

Relays
Impedance Coils
Plugs
Condensers
Terminal Blocks

Everything for Telephone Systems.

Leich Load Dispatchers Boards for Power Systems.

LEICH ELECTRIC CO.

GENOA, ILL.

"Leich equipment increases toll revenue"

America's Health Resort

HOT SPRINGS

NATIONAL PARK
ARKANSAS

HOTEL
MAJESTIC
BATH HOUSE AND APARTMENTS

Sufferers from rheumatism, neuritis, kidney trouble high blood pressure and kindred ailments find swift and sure relief in the 46 world famous springs at Hot Springs, Arkansas.. Worn-out systems are toned up; new health comes to jagged nerves.

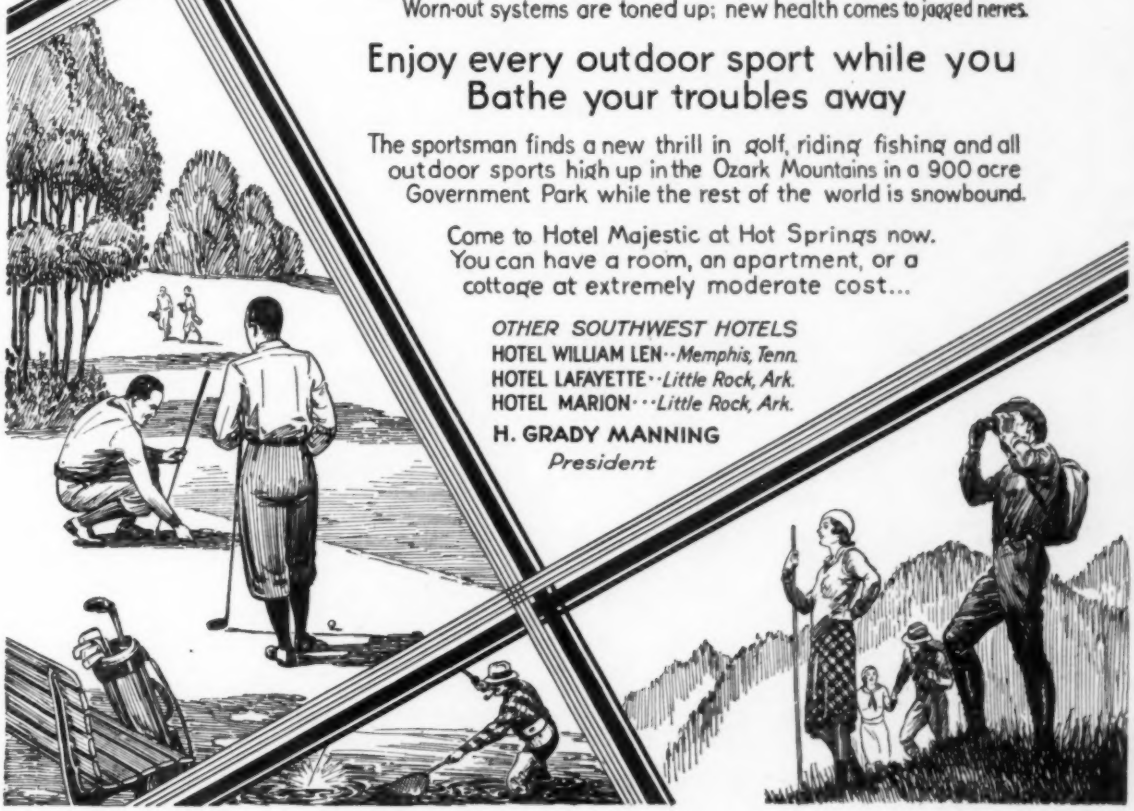
Enjoy every outdoor sport while you Bathe your troubles away

The sportsman finds a new thrill in golf, riding fishing and all outdoor sports high up in the Ozark Mountains in a 900 acre Government Park while the rest of the world is snowbound.

Come to Hotel Majestic at Hot Springs now. You can have a room, an apartment, or a cottage at extremely moderate cost...

OTHER SOUTHWEST HOTELS
HOTEL WILLIAM LEN··*Memphis, Tenn.*
HOTEL LAFAYETTE··*Little Rock, Ark.*
HOTEL MARION···*Little Rock, Ark.*

H. GRADY MANNING
President



NORTH COMPANY'S
ALL-RELAY
DIAL-AUTOMATIC
EQUIPMENT

REMEMBER OUR TELLING YOU ABOUT
HAGEMAN'S ORDERING ONE OF THEM FOR VERMILLION,
OHIO, A 300-LINE EQUIPMENT

IT WAS SHIPPED FROM THE FACTORY
OCTOBER NINETEENTH—100 MILES BY TRUCK
INSTALLED BY HAGEMAN'S MEN IN THREE DAYS
CUT OVER OCTOBER 24 IN TWO MINUTES

IT HAS NOT BEEN
ADJUSTED, CLEANED, REPAIRED, OILED
OR TINKERED IN ANY WAY WHATEVER
SINCE IT WAS SHIPPED

IT DID NOT FAIL IN OPERATION
ON THE INITIAL TESTS AFTER INSTALLATION
AND HAS NOT FAILED SINCE IN SERVICE
400 TEST CALLS FROM SUBSCRIBERS' STATIONS
SHOW NO FAILURES

WE ARE TELLING YOU NOW
IT WILL OPERATE FOR YEARS LIKE THAT

LOCK THEM UP
LEAVE THEM ALONE
THEY WILL WORK

NORTH ELECTRIC
MANUFACTURING COMPANY
GALION, OHIO